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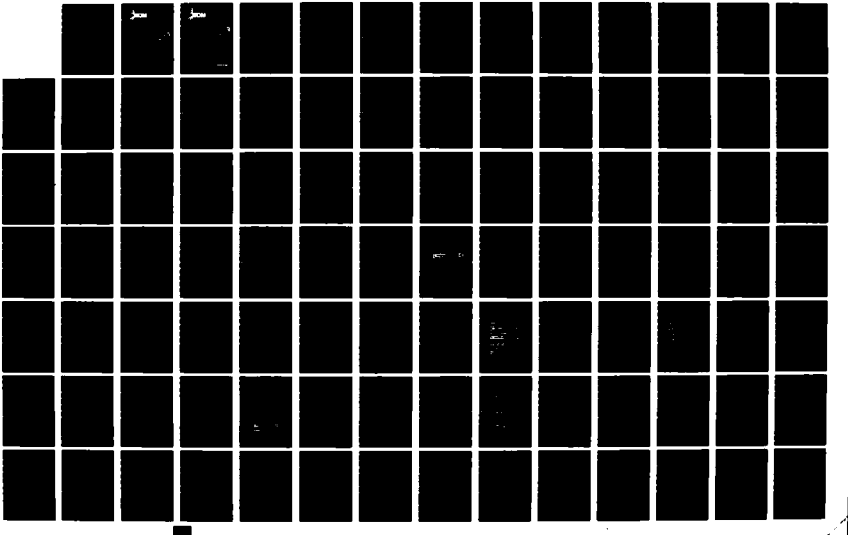

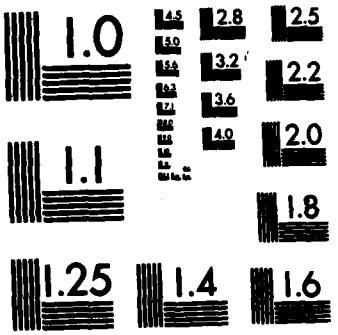

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THE BDM CORPORATION

INTEGRATED NUCLEAR AND CONVENTIONAL THEATER WARFARE SIMULATION (INWARS) DOCUMENTATION

PART IV
USER'S MANUAL COMPONENT
VOLUME III
EAD C^2I INPUTS

THE BDM CORPORATION

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February 8, 1980

BDM/W-80-047-TR

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FOREWORD

This is Volume III of the User's Manual Component of the Integrated Nuclear and Conventional Theater Warfare Simulation (INWARS) documentation. It discusses the form and content of user inputs to the INWARS treatment of Echelon Above Division Command, Control, and Intelligence (C^2_uI) capabilities.

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CHAPTER I
INTRODUCTION AND OVERVIEW

This volume of the INWARS User's Manual describes the inputs used in the Command, Control, and Intelligence (C^2I) activities of INWARS C^2I elements at Echelons Above Division (EAD). In essence, these inputs characterize the doctrines, policies, and parameters used by the EAD C^2I elements in their information, decision, planning, and control processes. The inputs are accordingly concentrated in the "Fundamental Knowledge" portion of the C^2I elements' respective Understandings of the Situation (UOS's) presented in Figure I-1. In fact, the C^2I input procedures can be characterized as procedures to create a UOS for each EAD C^2I element and load it with certain basic information.

A. STRUCTURE OF C^2I INPUT PROCEDURES

The mechanism by which EAD C^2I inputs are made is a User-Oriented Input Language (or UOIL). Besides facilitating the input of specific values to specific C^2I information elements, the UOIL enables the user to easily establish relationships among different information blocks and structures. As will become apparent over the sequel, this latter attribute is extremely important to the C^2I inputs due to the varied relationships and linkages among structures within the UOS.

In broad terms, C^2I information elements are structured into certain "blocks" or "records." Blocks are then related to one another by access references or pointers stored in the related blocks. A common C^2I information structure is a directory of linked lists of certain types of information blocks. Figure I-2 portrays an example of such a structure which will be used for illustrative purposes in this introduction.

Also in broad terms, the C^2I portion of the INWARS UOIL can be regarded as consisting of two basic types of statements: (1) input control statements, and, (2) input value statements. Input control statements concern what types of block inputs are about to be received and/or how

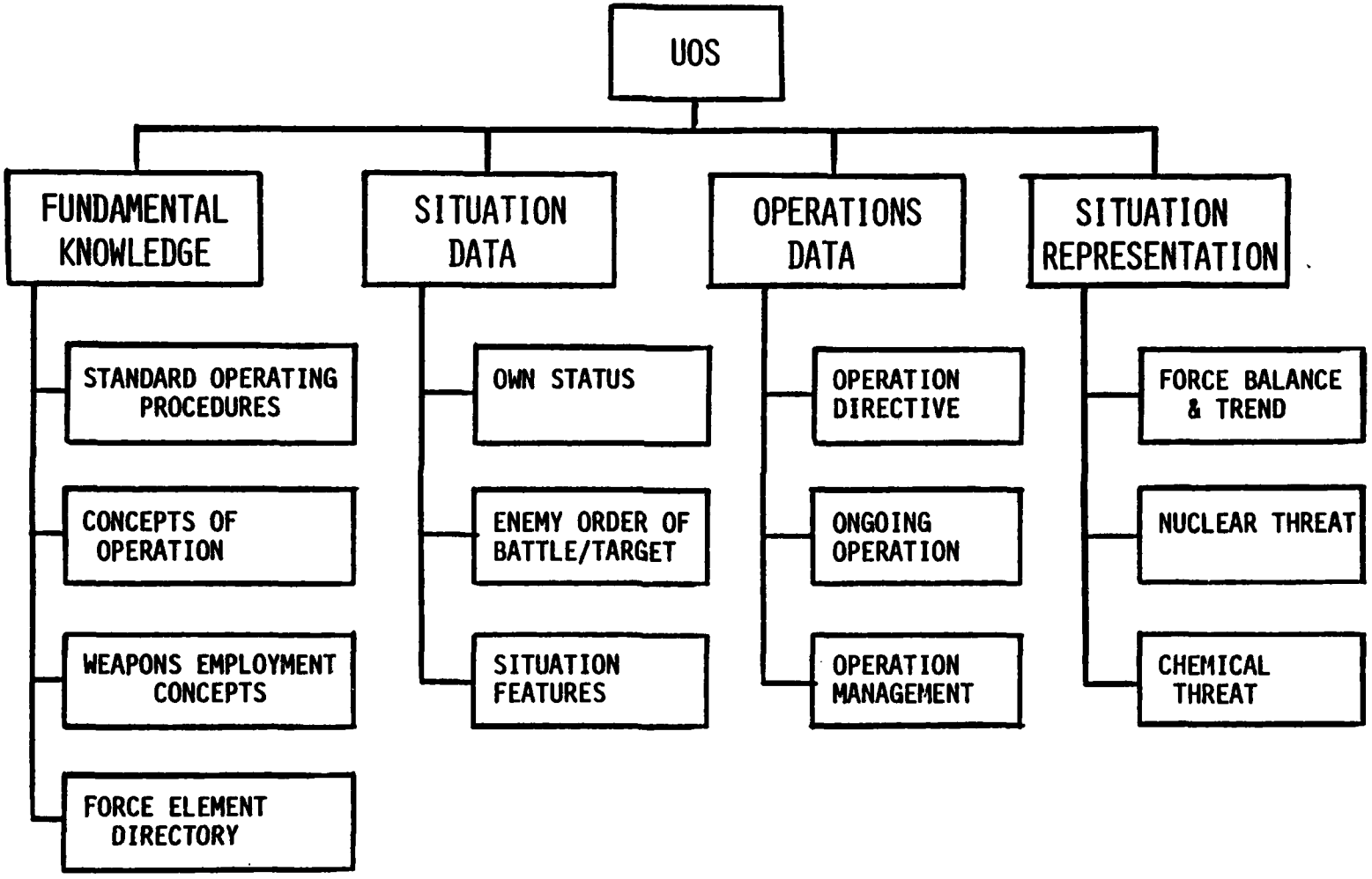

Figure I-1. Structure of C^2I Element Understanding of the Situation (UOS)

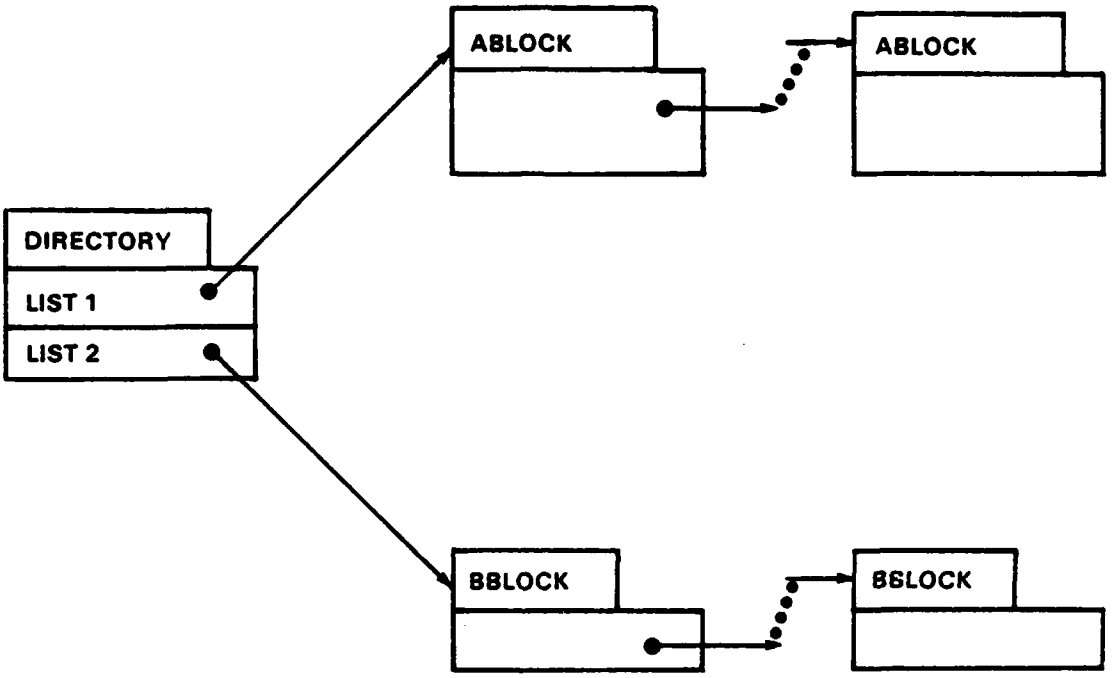

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Figure I-1. Simple Directory of Lists

those blocks are to be accessed (i.e., where access references--pointers--to them are to be stored). By contrast, input value statements cause specific input values to be assigned to specific information elements in a given block. In effect, then, input control statements invoke routines to process input value statements for given types of information blocks.

Certain input control statements can be repeated or "nested" under other input control statements. This permits complex information structures involving many interlinked information blocks to be input in a direct and self-documenting fashion. This can be illustrated with the aid of the simple directory example portrayed in Figure I-2. A characteristic input approach would involve three distinct types of input control statements, e.g., 'DIRECTORY', 'ABLOCK', and 'BBLOCK'. The "grammar" of these control statements would recognize sequences consisting of: (1) a single instance of 'DIRECTORY', followed by (2) an arbitrary number of instances of 'ABLOCK', followed by (3) an arbitrary number of instances of 'BBLOCK'. Of course, each instance of 'ABLOCK' or 'BBLOCK' would typically be followed by an appropriate set of input value statements to insert into the blocks. Figure I-3 illustrates a typical case.

In the case exemplified by Figure I-3, the instance of 'DIRECTORY' would create a directory block. Each subsequent instance of 'ABLOCK' would create an ABLOCK and link it into LIST1 in the directory block (and insert specific values as specified in the corresponding input value statements). Likewise, each subsequent instance of 'BBLOCK' would create a BBLOCK and link it into LIST2 in the directory block. The result of the example would be a single directory containing a list of two ABLOCKs and a list of three BBLOCKs.

B. UOIL PRESENTATION CONVENTIONS

To present the C^2I UOIL, the input control statements, their grammar, and the input value statements must be described. The approach taken in this volume follows the "flow" of the C^2I UOIL. Input control statements are introduced in the order in which they would be used in a "typical"

•
•
•

DIRECTORY

ABLOCK
(ABLOCK INPUT VALUE STATEMENT)

ABLOCK
(ABLOCK INPUT VALUE STATEMENT)

BBLOCK
(BBLOCK INPUT VALUE STATEMENT)

BBLOCK
(BBLOCK INPUT VALUE STATEMENT)

BBLOCK
(BBLOCK INPUT VALUE STATEMENT)

•
•
•

Figure I-3. Typical Case of Directory Input

input. Likewise, when an input control statement would be followed by input value statements, the information block to be "filled" is introduced and information elements to be input are described.

To facilitate the presentation and eliminate the need for repetitious detail, it is convenient to adopt certain formats and conventions for use in the descriptions. These conventions are described in this section.

1. General Conventions

The so-called Backus Normal Form (BNF) notation for describing grammatical aspects of a language has been generally adopted as will now be discussed.

a. String Notation

Explicit strings to be used in the C^2I UOIL statements are presented in capital letters. Implicit strings are also presented in capitals, but are enclosed with double bars ('||'). An example illustrating both notations is:

'DIRECTORY = ||NAME||'

This description characterizes a string consisting of the explicit string 'DIRECTORY = ' followed by an implicit arbitrary string being used as a name.

b. Descriptors

It is convenient to be able to utilize a descriptor which can stand for any element of a certain class of strings in a particular construction. For this purpose, the name of the descriptor (in capitals) is enclosed in carats. As an example, '<TYPE>' might be introduced to stand for any of the strings 'COMBAT', 'COMBAT SUPPORT', or 'SERVICE SUPPORT'. The construction '<TYPE> ELEMENT' would then stand for any of the strings 'COMBAT ELEMENT', 'COMBAT SUPPORT ELEMENT', or 'SERVICE SUPPORT ELEMENT'.

c. Alternatives

When any one of several strings may be utilized in some construction, the class may be defined by listing the alternative strings separated by single bars ('/'). A common use of this notation is in

defining descriptors; for example, the descriptor <TYPE> could be defined as follows:

<TYPE> = COMBAT / COMBAT SUPPORT / SERVICE SUPPORT

The descriptor and alternative notations will sometimes be combined as in:

<COMBAT / COMBAT SUPPORT / SERVICE SUPPORT>

d. Sequences

Given the frequent occurrence of repetitive structures such as lists, it is convenient to have some means of representing arbitrary (non-empty) sequences of strings. For this purpose, braces are utilized ('{' and '}'). A common usage of this notation is exemplified by

{<COMBAT / COMBAT SUPPORT / SERVICE SUPPORT>},

which represents any non-empty sequence of the strings 'COMBAT', 'COMBAT SUPPORT', and 'SERVICE SUPPORT' separated by commas. (The comma following the last string in the sequence may be omitted.

e. Optional Strings

The final general convention adopted provides a means of reflecting the optional occurrence of a string in a given construct. The optional string is simply enclosed in brackets ('[' and ']'). Thus, for example,

'[COMBAT] SERVICE SUPPORT'

represents either the string 'COMBAT SERVICE SUPPORT' or 'SERVICE SUPPORT'.

2. Information Block Description Conventions

Rather than simply describing input value statements associated with given information blocks, the blocks themselves will be presented and described. Besides simplifying the language description, this practice provides an opportunity to present the overall block structure and discuss the information elements it contains. The format adopted for block presentation involves: (1) a graphic portrayal of the block, and (2) a description of certain of its information elements (including range and input format).

a. Graphic Portrayal

The format for graphic portrayal of an information block is exemplified in Figure I-4. Information conveyed in the graphic portrayal will now be highlighted.

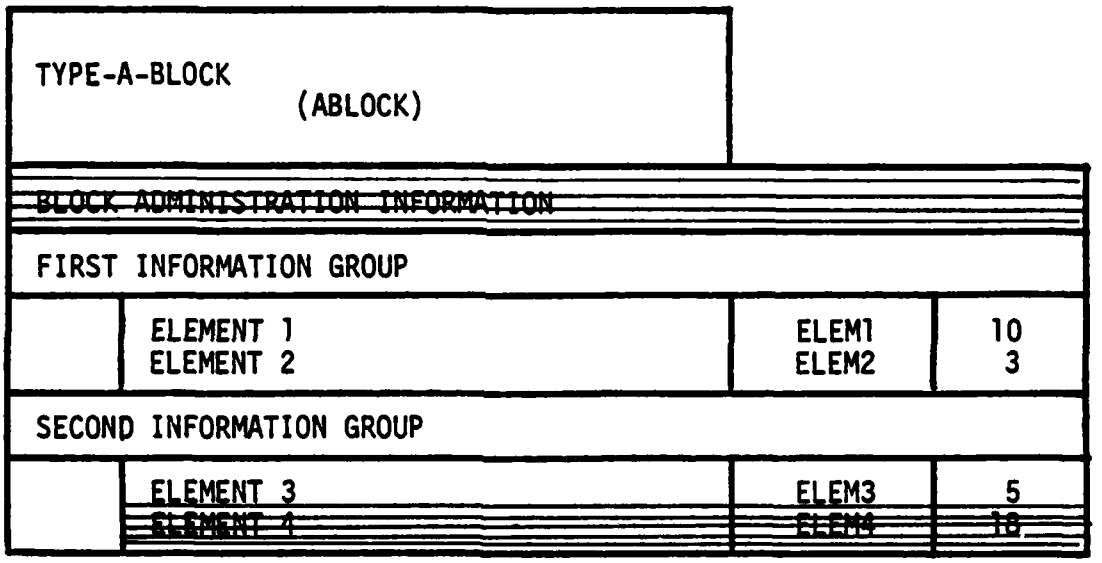

Figure I-4. Illustrative Graphic Portrayal of Information Block

1) Block Heading

The block heading gives the informal name applied to the type of block ("Type-A-Block") and also specifies the formal block identifier in brackets ("ABLOCK").

2) Information Element Groups

The particular information elements contained in the block are frequently presented in groups to facilitate description. In the example, three groups exist: (1) Block Administration Information, (2) First Information Group, and (3) Second Information Group. Most C^2I information blocks contain the Block Administration Information group. It contains information elements used by the software in managing the creation and release of instances in the block; these information elements are uniformly deleted in this manual since they are transparent to the user. This is also suggested by the hatching which indicates that direct (user) inputs are not made to these information elements.

It is emphasized that the information groups have no significance to the software which processes the blocks; they are merely an aid to presenting the blocks.

3) Information Elements

Three basic characteristics of the actual information elements contained in the block are presented in the graphic portrayal: (1) the informal name of the information element ("ELEMENT 1"); (2) the formal identifier of the information element ("ELEM1") used by the software; and (3) the number of bits allocated for storage of values assigned to the information element (10 bits for ELEM1). Certain other features of the information elements are suggested in the graphic portrayal. If an information element (or group) is masked with cross-hatching, it is not a direct user input (i.e., it cannot be set by an input value statement). Also, if an information element's formal identifier is starred (as is ELEMENT 4--"ELEM4*"), the element implements a pointer to some information block.

b. Description of the Block

A verbal description of each information block supplements its graphic portrayal. This description generally includes a description

of the overall block, its purpose in the model, and its relation to other blocks. Certain information elements contained in the block are then described. Non-direct-input (hatched) information elements may or may not be discussed. Direct input information elements are always described by means of an informal characterization of what they represent and, in some cases, how they are used in the model. In addition, the range and input format of direct input information elements are specified.

1) Range

The range of an information element is specified in terms of the permissible values which may be input to the element. This implicitly specifies the precision and the units of the information element.

2) Input Format

The input format may be specified explicitly in terms of the form of strings which constitute acceptable input values; this is frequently used for indication type information elements. Alternatively, input format may be specified by reference to a standard format such as "real" or "integer."

3. Input Statement Conventions

The final set of conventions to be presented concerns the C^2I UOIL input statements themselves.

a. Format

Each C^2I UOIL input statement--an input control statement or an input value statement--must appear on a single line ("card image"); any other statement on that line will be regarded as a syntax error. However, the statement may appear anywhere on the line; this enables the user to employ indentation to reflect "nesting" of structure inputs.

b. Input Control Statement Conventions

Many of the C^2I UOIL input control statements are made up of a keyword (signalling the start of input for a certain type of block or structure) together with a name (to be "attached" to the resulting structure for referencing later in the input text). Such names may be arbitrarily assigned by the user subject to one constraint: no name may be

used to refer to more than one structure in the overall input text. In other words, once a name such as "Blue Corps" is used, it may not be used again (except, of course, in refering back to the structure it was initially associated with). Inadvertent use of a single name to refer to more than one structure will cause a UOIL syntax error.

c. Input Value Statement Conventions

Input value statements in the C^2I UOIL set particular information elements in a block to particular values. They all have the same format which is:

<INFORMATION ELEMENT IDENTIFER> = <VALUE>.

where:

(1) <INFORMATION ELEMENT IDENTIFIER> is the "name" of the information element within the block being input, and,

(2) <VALUE> is a permissible value for the information element.

This, for example, 'ELEM1=14' would cause the information element identified by 'ELEM1' in an ABLOCK to be set to a value of 14 (see Figure I-4, above). Not all information elements in a block need be input. Thus, omitting an input value statement for some particular information element in a block will not cause an error in the UOIL; it will simply leave a value of Ø in that information element.

C. INITIATING THE C^2I INPUT PROCESSES

To initiate the C^2I input processing, all inputs must be preceded by the line,

C^2I.

This line invokes the proper procedures to begin receiving C^2I inputs including Fundamental Knowledge, UOS Specifications and Directives as discussed in Chapters II, III, and IV, below. The C^2I inputs cannot be entered until all combat interactions inputs have been made as described in the User's Manual, Volume II.

CHAPTER II
FUNDAMENTAL KNOWLEDGE INPUTS

The bulk of the EAD C^2I inputs specify Fundamental Knowledge components of UOS structures. Fundamental Knowledge components do not change over the course of a simulation run. Moreover, the C^2I processes have been designed to permit many C^2I elements to share Fundamental Knowledge components, thus concerving storage space and facilitating input preparation. For example, the user may prepare and input one set of concepts of operation for each side of the simulation. By naming each set of concepts (e.g., "Blue concepts" and "Red concepts"), it becomes possible to provide C^2I element access to the appropriate set via the name rather than inputing the same set repeatedly.

Thus, the first step in reparing the C^2I input is to create (input) named UOS components which can be referenced during the creation of UOS's for individual EAD C^2I elements. In broad terms, the types of UOS components which are constructed in this step include: (1) Standard Operating Procedures (SOP) Information; (2) Updating Thresholds and Flags (considered part of SOP information, but constructed separately to facilitate broader sharing among C^2I elements); (3) Sets of Concepts of Operation; (4) Sets of Weapons Employment Concepts; and (5) Sets of Weapons Parameters (considered a part of Employment Concepts, but constructed separately to permit broader sharing among C^2I elements). In some cases, subordinate information structures are also constructed as named UOS components within these broad structures. The reader is referred to the Software Description, Volume II, Chapter II, Sections B-F, for further discussion of Fundamental Knowledge components of the UOS. EAD C^2I activities themselves are discussed in the Modeling Description, Volume V, and also in the Software Description, Volume III.

A. CREATE NAMED SOP COMPONENTS

As described in the Software Description, Volume II, Chapter II, Section B, an SOP component consists of a fixed block of parameters describing friendly and enemy operational norms, timing information, nuclear/chemical weapon employment information, and message security and priority information. In addition, an SOP component includes references to lists of nuclear and chemical readiness blocks. These lists are created first as named UOS components and then referenced by name in creating the SOP parameter blocks.

SOP components would typically vary between sides. Moreover, since certain SOP information--notably operational norms--reflects characteristics of different echelons of command, SOP components would also vary among echelons within a given side. Thus, it is expected that there will typically be at least six distinct SOP components (2 sides x 3 echelons per side).

To initiate the creation of named SOP components, the line:

'SOP'

must precede the inputs which define the components.

1. Create Named Readiness Lists

The first step in creating named SOP components is to create an appropriate set of named readiness lists. Each readiness list consists of an ordered list of readiness blocks which define nuclear and chemical readiness states and corresponding actions to be taken to adapt to those readiness states. The ordering of the list reflects increasing readiness states.

Typically, readiness doctrines would vary between sides; thus, there would generally be at least two nuclear and two chemical lists. Additional lists may be needed if it is desired to distinguish readiness doctrines at different echelons of command.

To initiate the creation of a specific readiness list, the line:

'READINESS LIST = ||NAME|| <NUCLEAR/CHEMICAL>'

must precede the inputs of the various readiness blocks to be included in the list. The inputs defining each readiness block must be preceded by the line:

'RDYBLK'

Blocks must be input in order of increasing threat state value. Readiness block structure is presented in Figure II-1. Specific inputs will now be discussed.

a. Readiness State

An integer representing the readiness state defined by the block.

- Range: 0 - 7 (0 = "lowest" readiness state)
- Input Format: Integer

b. Lower and Upper Threat Index Limits

Thresholds on the appropriate threat index which define the threat index interval over which the readiness block is valid. Readiness blocks adjacent in the readiness list should have contiguous threat intervals; moreover, the threat intervals of all readiness blocks in the list should cover the entire threat index range (0.00-40.95). In other words, the threat intervals should partition the entire range of the threat index.

- Range: 0.00-40.95
- Input Format: Real

c. High Threat Targeting Concept

A flag which indicates whether or not the "high-threat" weapons employment concept is to be used in employing conventional weapons.

- Range: 0,1 (1 = use high-threat concept)
- Input Format: Integer

d. Information Required

A flag which indicates whether or not information should be requested from subordinate force elements.

- Range: 0,1 (1 = request information)
- Input Format: Integer

READINESS BLOCK (RDYBLK)		
INFORMATION BLOCK ADMINISTRATION		
BASIC READINESS BLOCK INFORMATION		
READINESS TYPE	RDYTYP	3
READINESS STATE	RDYST	3
LOWER THREAT INDEX LIMIT	LOTHRT	12
UPPER THREAT INDEX LIMIT	HITHRT	12
RESPONSE ACTIONS		
HIGH THREAT TARGETING CONCEPT	HITTGT	1
INFORMATION REQUIRED	INFRQD	1
REPORT REQUIRED	RPTRQD	1
WEAPONS EMPLOYMENT ACTION FLAGS	WPNACN	6
GROUND OPERATIONS DEVELOPMENT ACTIONS	GNDACN	15
STRUCTURE INFORMATION		
NEXT READINESS BLOCK POINTER	PNXRDY*	18

Figure II-1. Readiness Block Structure and Content

e. Report Required

A flag which indicates whether or not a report should be formulated and transmitted to the parent C^2I element.

- Range: 0,1 (1 = send report)
- Input Format: Integer

f. Weapons Employment Action Flags

A sequence of flags representing the types of weapons, if any, for which weapons employment considerations should be initiated.

- Range: N/A
- Input Format: {<CONVEN/NUC/CHM>,}

g. Ground Operations Development Actions

A sequence of flags representing the types of ground operations development actions which should be initiated.

- Range: N/A
- Input Format: {<ADV-NXT-PHASE|
  COMMIT-RESRVS|IMPL-COMMIT|
  ADJUST-RESOURCE|IMPL-ADJUST|
  MODIFY-OPN|IMPL-MOD|
  DEVELOP-NEW|IMPL-NEW>,}

2. Create Named SOP Blocks

Once an appropriate list of named readiness lists has been created, the named SOP blocks can be created. The inputs defining each block must be preceded by the line:

'SOP = ||NAME||'

SOP block structure is presented in Figure II-2. Specific inputs will now be discussed.

a. Friendly Operational Norm Information

These information elements represent "normal" or "typical" friendly values of various factors and parameters involved in the development and execution of operations. Values for these norms may vary among echelons of command.

STANDARD OPERATING PROCEDURES DATA BLOCK (SOPBLK)		
INFORMATION BLOCK ADMINISTRATION		
FRIENDLY OPERATIONAL NORM INFORMATION		
CAS RESERVATION FRACTION	CASRFR	7
SUBORDINATE CAS ALLOCATION	SUBCAS	12
INTERDICTION RESERVATION FRACTION	INTRFR	7
SUBORDINATE INTERDICTION ALLOCATION	SUBINT	12
NUCLEAR WEAPONS RESERVATION FRACTION	NUCRFR	7
NUC THREAT PERCEPTION MODIFICATION FACTOR	NUCTMF	9
SUBORDINATE NUCLEAR WEAPONS ALLOCATION	SUBNUC	18
CHEMICAL WEAPONS RESERVATION FRACTION	CHMRFR	7
CHEM THREAT PERCEPTION MODIFICATION FACTOR	CHMTMF	9
SUBORDINATE CHEMICAL WEAPONS ALLOCATION	SUBCHM	18
SUPPLY DISTRIBUTION FRACTION	SUPDST	7
SUBORDINATE SUPPLY ALLOCATION	SUBSUP	18
REPLACEMENT DISTRIBUTION FRACTION	RPLDST	7
OVERALL FORCE FULL STRENGTH	TOESTR	18
SUBORDINATE COMBAT FULL STRENGTH	TOESUB	18
OWN INEFFECTIVENESS THRESHOLD	OWNINF	9
SUBORDINATE ADVANCE RATE	SUBADV	7
HIGH FORCE BALANCE ADVANCE RATE FACTOR	HIHI	9
LOW FORCE BALANCE ADVANCE RATE FACTOR	LOLO	9
MAXIMUM SEPARATION FOR RESERVE COMMITMENT	MXRSCS	7
ENEMY OPERATIONAL NORM INFORMATION		
RELEVANT OPPOSING C^2I ECHELON	RC2IEC	3
RELEVANT OPPOSING NON-C^2I ECHELON	ROTHEC	3
RELATIVE OVERALL FORCE SIZE	OVRRSZ	9
RELATIVE SUBORDINATE FORCE SIZE	SUBRSZ	9
ENEMY INEFFECTIVENESS THRESHOLD	ENEINF	9
TIMING INFORMATION		
MAX TIME BETWEEN RESOURCE ADJUSTMENTS	MXRATM	18
MIN TIME BETWEEN RESOURCE ADJUSTMENTS	MNRATM	18
MIN TIME BETWEEN OPERATION MODIFICATION	MNOMTM	18
PLANNING DELAY TIME	PLANTM	18
REGULAR REPORTING INTERVAL	RPTINT	18
COMPREHENSIVE REVIEW INTERVAL	RVWINT	18
MAX EOB/TGT BLOCK AGE	MXETAG	18
MAX SITUATION FEATURE BLOCK AGE	MXSFAG	18
• • •		

Figure II-2. STD Operating Procedures Data Block Information Structure

NUCLEAR/CHEMICAL EMPLOYMENT INFORMATION		
NUCLEAR READINESS BLOCK LIST	PNUCRY*	18
CHEMICAL READINESS BLOCK LIST	PCHMRY*	18
NUCLEAR/CHEMICAL EMPLOYMENT INFORMATION		
NUCLEAR EMPLOYMENT JUSTIFICATION MASK	NUCJST	12
SUBORDINATE NUCLEAR EMPLOYMENT INDICATOR	SUBNEI	1
MINIMUM NUCLEAR EMPLOYMENT	MINNUC	18
MAXIMUM NUCLEAR EMPLOYMENT	MAXNUC	18
MIN TIME BETWEEN NUCLEAR REQUEST	MNNRTM	18
CHEMICAL EMPLOYMENT JUSTIFICATION MASK	CHMJST	12
SUBORDINATE CHEMICAL EMPLOYMENT INDICATOR	SUBCEI	1
MINIMUM CHEMICAL EMPLOYMENT	MINCHM	18
MAXIMUM CHEMICAL EMPLOYMENT	MAXCHM	18
MIN TIME BETWEEN CHEMICAL REQUESTS	MNCRTM	18
MAX ENEMY RESPONSE STRENGTH REDUCTION	MXESTR	18
MAX COLLATERAL DAMAGE PER EMPLOYMENT	MXCDEM	18
MAX COLLATERAL DAMAGE PER ASSIGNMENT	MXCDAS	18
WEAPONS REQUEST FILL FRACTION	WRFILL	7
MESSAGE INFORMATION		
DIRECTIVE SECURITY	DIRSEC	2
DIRECTIVE PRIORITY	DIRPRI	4
REQUEST SECURITY	REQSEC	2
REQUEST PRIORITY	REQPRI	4
REPORT SECURITY	RPTSEC	2
REPORT PRIORITY	RPTPRI	4

Figure II-2. STD Operating Procedures Data Block Information Structure (Continued)

1) Reservation Fractions

Fractions reflecting the "normal" portions of available resources--CAS, interdiction, nuclear and chemical weapons--which would be reserved by a C^2I element for its own discretionary control.

- Range: 0.00 - 1.00
- Input Format: Real

2) Distribution Fractions

Fractions reflecting the "normal" extent to which supplies and replacements would be made available to subordinates rather than retained by a C^2I element for later use.

- Range: 0.00 - 1.00
- Input Format: Real

3) Subordinate Allocations

Absolute "normal" allocations of resources--CAS, interdiction, nuclear and chemical weapons, and supplies--to a "typical" subordinate in a developed operation. (Should be set to 0 if subordinates are not to be allocated resources.)

- Ranges:
  - CAS & Interdiction: 0-4000 sorties/day
  - Nuclear Weapons: 0-262,000 nuclear weapons units (e.g., kilotons)
  - Chemical Weapons: 0-262,000 chemical weapons units (e.g., tons)
  - Supplies: 0-262,000 tons/day
- Input Format: Integer

4) Threat Perception Modification Factors

A parameter reflecting the extent to which desired allocations of nuclear and chemical weapons for planning purposes are increased by higher nuclear or chemical threat indices. The higher the threat modification factor, the greater will be reservations and desired allocations. A value of 0.00 nullifies the threat perception modification.

- Range: 0.00 - 5.00
- Input Format: Real

5) Full Strength Norms

The nominal full or "TOE" strength of the overall force and subordinate force elements commanded by a given C^2I element. (Varies with side and echelon of command).

- Range: 0 - 262,000 strength units
- Input Format: Integer

6) Own Ineffectiveness Threshold

A threshold on aggregate force capabilities (extent of suppression) above which subordinate force elements should be considered ineffective.

- Range: 0-512 (512 = "complete" suppression)
- Input Format: Integer

7) Subordinate Advance Rate

The expected rate at which subordinate force elements will move towards assigned objectives in "normal" force balance conditions.

- Range: 0-128 kilometers/hour
- Input Format: Integer

8) High/Low Force Balance Advance Rate Factors

Essentially scaling factors to be applied to expected subordinate advance rates to adjust for favorable or unfavorable force balance conditions.

- Range: 0.00 - 5.00
- Input Format: Real

9) Maximum Separation For Reserve Commitment

The maximum lateral distance (within the standard 100 x 200 planning grid) by which a reserve force element can be separated from a forward force element and still be considered for commitment in support of that force element.

- Range: 0 - 100 planning grid units
- Input Format: Integer

b. Enemy Operational Norm Information

These information elements represent "normal" or "typical" enemy values of various parameters and factors involved in the development

and execution of operations. As with friendly operational norms, values may be expected to vary among echelons of command.

1) Relevant Opposing Echelons

The enemy echelon which is of principal interest to the given C^2I element. The relevant C^2I echelon will normally be one echelon higher than relevant non-C^2I echelon; it will also normally be the enemy echelon analagous to that of the given C^2I element.

- Range: N/A
- Input Format: <BRIGADE/REGIMENT/DIVISION/ CORPS ARMY/ARMY GROUP/ FRONT/THEATER>

2) Relative Force Sizes

The nominal size of a full "TOE" strength enemy force and subordinate force elements, relative to that of friendly force elements at the corresponding echelons. That is, for a "Blue" SOP, relative force sizes would be set to the quotient of "Red" strength over "Blue" strength.

- Range: 0.00 - 5.00
- Input Format: Real

3) Enemy Ineffectiveness Threshold

A threshold on aggregate enemy force capabilities (extent of suppression) above which enemy force elements should be considered ineffective.

- Range: 0 - 512 (512 = "complete" suppression)
- Input Format: Integer

c. Timing Information

These information elements represent various planning factors and thresholds on elapsed time between certain types of C^2I actions.

1) Maximum Time Between Resource Adjustments

The maximum time which should be allowed to elapse between operations development actions which adjust allocations of

resources among the C^2I element and its subordinates. Used to insure that resource allocations do not become inappropriate to the situation.

- Range: 0 - 4000 hours
- Input Format: Integer

2) Minimum Time Between Resource Adjustments

The minimum time which should be allowed to elapse between self-initiated adjustments of resource allocations. Used to prevent frequent resource adjustments whose impact is never realized.

- Range: 0 - 4000 hours
- Input Format: Integer

3) Minimum Time Between Operation Modifications

The minimum time which should be allowed to elapse between self-initiated modifications to an ongoing operation. Used to prevent frequent operations modifications whose impact is never realized.

- Range: 0 - 4000 hours
- Input Format: Integer

4) Planning Delay Time

The expected time between the completion of an operation development action (resource adjustment, operation modification, new operation development) and the actual implementation of that action at the operating echelons (divisions and brigades).

- Range: 0 - 4000 hours
- Input Format: Integer

5) Regular Reporting/Comprehensive Review Intervals

Normal time intervals between: (1) the preparation of regular reports for superior C^2I elements, and (2) the carrying out of a comprehensive review of the situation.

- Range: 0 - 4000 hours
- Input Format: Integer

6) UOS Purge Age Threshold Information

The maximum age at which Enemy Order of Battle/Target blocks and Situation Feature blocks may still be retained in the UOS.

Beyond this age, the blocks may be deleted from the UOS (in the first UOS purge activity after the age has been exceeded).

- Range: 0 - 4000 hours
- Input Format: Integer

d. Nuclear/Chemical Readiness Information

This information is contained in the named readiness lists created earlier. References to the desired lists are input to the SOP block by means of the lists' names as in the following lines:

'NUCLEAR READINESS = || NAME || '

and

'CHEMICAL READINESS = || NAME || '

Of course, the respective names refer to readiness lists input as described in Section 1, above.

e. Nuclear/Chemical Employment Information

These information elements represent doctrinal constraints on the employment of nuclear and chemical weapons.

1) Justification Masks

Nuclear and chemical employment justification masks delimit the situations under which emeployment of the corresponding weapons may be authorized. The possible situations are: (1) Critical Forward Operation Progress, (2) Critical Forward Operation Failure, (3) Critical Kernel Operation Progress, (4) Critical Kernel Operation Failure, (5) Critical Strength, (6) Critical Unit Balance, (7) Critical Nuclear Threat, and (8) Critical Chemical Threat. Any or all of these may be flagged as acceptable justifications. The justification masks may therefore be used to constrain given C^2I elements' employment of nuclear and chemical weapons to certain situations.

- Range: N/A
- Input Format: {<FWD PROGRESS/FORWARD FAIL/
  KERNEL PROGRESS/KERNEL FAIL
  STRENGTH/UNIT BALANCE/
  NUCLEAR THREAT/CHEMICAL THREAT>,}

(named conditions are flagged as acceptable justifications)

2) Subordinate Employment Indicators

Flags which indicate whether or not the given C^2I element's subordinates can develop employments of the given type of weapons.

- Range: 0,1 (1 = subordinates can employ)
- Input Format: Integer

3) Minimum/Maximum Employment

Upper and lower limits on the amount of nuclear or chemical weapons which may be used in a given employment. Provides an additional means of constraining C^2I elements in their employment of nuclear and chemical weapons.

- Range: 0 - 262,000 nuclear weapons units (e.g., kilotons)
  0 - 262,000 chemical weapons units (e.g., tons)
- Input Format: Integer

4) Minimum Time Between Nuclear/Chemical Requests

The minimum time which should be allowed to elapse between requests to a parent C^2I element for nuclear or chemical weapons. Used to prevent frequent requests which may not be fully considered.

- Range: 0 - 4000 hours
- Input Format: Integer

5) Maximum Enemy Response Strength Reduction

The maximum amount by which expected enemy strength may be reduced in a given employment of nuclear or chemical weapons. Provides a means of considering expected enemy response to a nuclear or chemical attack: strength reductions above this threshold might cause an "unacceptable" enemy response.

- Range: 0 - 262,000 (strength units)
- Input Format: Integer

6) Maximum Collateral Damage

The maximum amount of expected collateral damage (per employment or per specific weapons assignment) which is doctrinally acceptable.

- Range: 0 - 262,000 (collateral damage units)
- Input Format: Integer

7) Weapons Request Fill Fraction

The minimum portion of a weapons request which can be filled (authorized). If available authorized weapons do not exceed this fraction, the request cannot be filled, but must rather be passed on to the parent C^2I element for action.

- Range: 0.00 - 1.00
- Input Format: Real

f. Message Information

These information elements represent the communications policies in terms of the level of security and priority with which different types of messages--directives, requests, and reports--are to be transmitted.

1) Security

An integer reflecting the level of security with which different types of messages should be transmitted.

- Range: 0 - 3 (3 = highest level)
- Input Format: Integer

2) Priority

An integer reflecting the priority with which different types of messages should be transmitted.

- Range: 0 - 7 (7 = highest priority)
- Input Format: Integer

B. CREATE NAMED UPDATING THRESHOLDS/FLAGS COMPONENTS

Collectively, information elements included in the updating thresholds and flags components guide C^2I elements as they monitor changes in then UOS. In particular, as various situation data and representation blocks in the UOS are updated in response to new information, certain information elements in the blocks are checked for "operationally significant changes". If such changes are identified, a corresponding set of actions is invoked

to accomplish derivative UOS updating procedures (aggregating own status or enemy order of battle/target information, updating force balance, or revising threat indice) or to check for certain types of contingencies (see the Modeling Description, Volume V, Chapter III). Updating thresholds and flags govern these processes by: (1) defining what constitutes an "operationally significant change" in the various information elements (via updating thresholds) and, (2) prescribing actions to be accomplished upon identification of such changes (via updating flags).

Updating thresholds and flags are properly considered to be SOP type information. They are organized separately because it may be reasonable to ignore echelon differences and thus provide only two sets of updating thresholds and flags (namely, one for each side). The present organization permits this.

As was discussed in the Software Description, Volume II, Chapter II, Section B, updating thresholds and flags are organized in blocks corresponding to the situation data or situation representation blocks they are used to update and monitor. To facilitate accessing, references to all updating thresholds/flags blocks are consolidated in one structure known as the Updating Threshold/Flag (UTF) Directory. In particular, this directory contains references to Updating Threshold/Flag (UTF) blocks for: (1) basic Own Status updating, (2) aggregiate Own Status updating; (3) basic Enemy Order of Battle/Target updating; (4) aggregate Enemy Order of Battle/Target updating; (5) Situation Feature updating; (6) Situation Representation updating; (7) Nuclear Threat Index updating; and (8) Chemical Threat Index updating.

Although eight updating threshold/flag blocks are referenced, only four distinct types of updating threshold/flag blocks exist. The first four directory references are to instances of the unit block UTF block. The fifth directory reference is to an instance of the situation feature UTF block. The sixth directory reference is to an instance of the situation representation UTF block. The seventh and eighth directory references are to instances of the threat updating parameters block.

The input procedure for updating thresholds and flags information involves two steps. First, appropriate UTF blocks are created as named UOS components. Second, appropriate sets of these blocks are compiled into named UTF directories for subsequent use in the creation of individual UOS structures.

To initiate this procedure, all block and directory inputs must be preceded by the line:

'UTF'

This will then be followed by a sequence of individual named UTF block inputs and then by lines which create appropriate named UTF directories.

1. Create Named Unit Block UTF Block

Unit block UTF blocks are used in monitoring Own Status and Enemy Order of Battle/Target information at both the basic level (i.e., in response to received reports) and the aggregate level (i.e., in response to a derivative aggregation procedure). One block must be created for each pairing of information type and level.

The input for each unit block UTF block must be preceded by the line:

'BLOCK = ||NAME|| UNITBLK'

The strucutre of the unit block UTF block is presented in Figure II-3. Its information elements will now be discussed in terms of the two basic groups: thresholds and flags.

a. Unit Block UTF Block Thresholds

Threshold information elements in the unit block UTF block represent "operationally significant" levels of change in associated unit block information elements. The significance of changes beyond the specified levels is that certain associated C^2I actions are implemented. These actions are represented by flags set in the corresponding flag set. Thus, for example, if the threshold defining an operationally significant strength increase is breached, the actions specified in the strength increase flags will be invoked. The possible actions will be discussed in more detail in the next section.

UNIT BLOCK UPDATING THRESHOLDS AND FLAGS (UBUPTF)

BLOCK ADMINISTRATION

THRESHOLDS

TARGET FRACTION ACQUIRED	FRACQT	18
LOCATION CHANGE	LOCCHT	18
AXIS OF OPERATIONS CHANGE	AXOPNT	18
SECTOR WIDTH INCREASE	SECINT	18
_____"_____ DECREASE	SECDCT	18
ACCELERATION	ACCELT	18
DECELERATION	DECELT	18
STRENGTH INCREASE	STRINT	18
_____"_____ DECREASE	STRDCT	18
RESOURCES INCREASE	RESINT	18
_____"_____ DECREASE	RESDCT	18
NUCLEAR WEAPONS INCREASE	NUCINT	18
_____"_____ DECREASE	NUCDCT	18
CAPABILITIES INCREASE	CAPINT	18
_____"_____ DECREASE	CAPDCT	18

CONTINUED

Figure II-3. Unit Block UTF Block Structure

FLAGS			
	LOCATION CHANGE	LOCCHF	36
	AXIS OF OPERATIONS CHANGE	AXOPNF	36
	SECTOR WIDTH INCREASE	SECINF	36
	_____"_____ DECREASE	SECDCF	36
	ACCELERATION	ACCELF	36
	DECELERATION	DECELF	36
	NUCLEAR READINESS CHANGE	NUCRDF	36
	CHEMICAL _____"_____	CHMRDF	36
	STRENGTH INCREASE	STRINF	36
	_____"_____ DECREASE	STRDCF	36
	RESOURCES INCREASE	RESINF	36
	_____"_____ DECREASE	RESDCF	36
	NUCLEAR WEAPONS INCREASE	NUCINF	36
	_____"_____ DECREASE	NUCDCF	36
	CAPABILITIES INCREASE	CAPINF	36
	_____"_____ DECREASE	CAPDCF	36
	ROLE CHANGE	ROLCHF	36
	MISSION CHANGE	MSNCHF	36
	OPERATION CHANGE	OPNCHF	36
	AT OBJECTIVE	ATOBJF	36
	NUCLEAR ATTACK VICTIM	NUCVCF	36
	CHEMICAL ATTACK VICTIM	CHMVCF	36
	TARGET FRACTION AQUIRED	FRACQF	36
	NEW SUBORDINATE EOB UNIT	NUSETF	36
	NEW AGGREGATE EOB UNIT	NUAETF	36

Figure II-3. Unit Block UTF Block Structure, Continued

Figure II-4 characterizes the unit block UTR block thresholds in terms of: (1) the test made and triggering condition under which the corresponding actions will be invoked; (2) the range of the threshold; and, (4) the input format for the threshold. Each time an own status or enemy order of battle/target block is updated, all tests are made: the test variable is computed based on the respective values in the "new" block and "old" block being updated. Actions associated with triggered test conditions are accumulated for all tests and invoked upon completion of the updating. (This precludes the wasteful possibility of repeating a given action invoked for each of several triggered test conditions).

b. Unit Block UTF Block Action Flag Words

Associated with each of the unit block UTF block thresholds is a sequence of flags corresponding to various C^2I actions which are to be carried out in the event the test condition defined by the threshold is triggered. In fact, sequences of flags are also included for certain operationally significant changes not requiring a threshold for their definition. Such changes concern outright differences between "old" and "new" values of certain qualitative information elements. These include: nuclear and chemical readiness, role, mission, operation, at objective indicator, nuclear or chemical attack victim indicator. The identification of a new enemy unit may also trigger the invocation of C^2I actions.

The range of possible C^2I actions which may be flagged for invocation are presented in Figure II-5. Note that these include: (1) certain derivative UOS updating actions (to trace the effects of a change to other information elements in the UOS); (2) reporting actions (to transmit new information to the parent C^2I element); and, (3) contingency checking actions (to consider the need for some response to the change).

Each word of flags in the unit block UTF block represents a string of 36 action flags. Actions presented in Figure II-5 are represented by the flags in the bit positions indicated (where least significant bit position = 1). Thus, to invoke the updating of force balance information, the transmission of a status report, and the checking for an operational progress contingency in response to an operationally significant

THRESHOLD	TEST CONDITION WHICH TRIGGERS CORRESPONDING ACTION FLAGS	RANGE	TYPICAL VALUE	INPUT FORMAT
TARGET FRACTION ACQUIRED	< NEW FRACTION/OLD FRACTION	0.00-10.00	1.50	REAL
LOCATION CHANGE	< DISTANCE (OLD LOCATION,NEW LOCATION)	0-1000km	15	INTEGER
AXIS OF OPERATIONS CHANGE	< ABS (NEW AXIS - OLD AXIS)	0-360^{o}	45^{o}	INTEGER
SECTOR WIDTH INCREASE	< NEW WIDTH/OLD WIDTH	0.00-10.00	2.00	REAL
SECTOR WIDTH DECREASE	> NEW WIDTH/OLD WIDTH	0.00-10.00	0.75	REAL
ACCELERATION	< SPEED RATE OF CHANGE	0-100km/hr^{2}	5	INTEGER
DECELERATION	< - SPEED RATE OF CHANGE	0-100km/hr^{2}	5	INTEGER
STRENGTH INCREASE	< NEW STRENGTH/OLD STRENGTH	0.00-10.00	1.10	REAL
STRENGTH DECREASE	> NEW STRENGTH/OLD STRENGTH	0.00-10.00	0.95	REAL
RESOURCES INCREASE	< NEW RESOURCES/OLD RESOURCES	0.00-10.00	1.50	REAL
RESOURCES DECREASE	> NEW RESOURCES/OLD RESOURCES	0.00-10.00	0.75	REAL
NUCLEAR WEAPONS INCREASE	< NEW WEAPONS/OLD WEAPONS	0.00-10.00	1.05	REAL
NUCLEAR WEAPONS DECREASE	> NEW WEAPONS/OLD WEAPONS	0.00-10.00	0.95	REAL
CAPABILITIES INCREASE	< NEW CAPABILITIES/OLD CAPABILITIES	0.00-10.00	1.50	REAL
CAPABILITIES DECREASE	> NEW CAPABILITIES/OLD CAPABILITIES	0.00-10.00	0.80	REAL

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Figure II-4. Characterization of Unit Block UTF Block Thresholds

ACTION	BIT POSITION
DERIVATIVE UOS UPDATING ACTION	
AGGREGATE OWN STATUS INFORMATION	5
AGGREGATE ENEMY ORDER OF BATTLE/ TARGET INFORMATION	6
UPDATE FORCE BALANCE INFORMATION	7
REPORTING ACTIONS	
SEND STATUS REPORT	16
SEND UNIT INTELLIGENCE REPORT	17
SEND SITUATION FEATURE REPORT	18
CONTINGENCY CHECKING ACTION	
CHECK NUCLEAR THREAT CONTINGENCY	23
CHECK CHEMICAL THREAT CONTINGENCY	24
CHECK OPERATIONAL PROGRESS CONTINGENCY	35
CHECK TARGET ENGAGEMENT OPPORTUNITY CONTINGENCY	36

Figure II-5. Possible C^2I Actions Which Can Be Invoked

increase in strength, bit 7, 16, and 35 must be set to '1' in the strength increase flags word (STRING).

- Range: 2^{10} different combinations of actions may be flagged in each flags word
- Input Format: {<bit position index>,} (which turns on the bits in the specified bit positions)

2. Create Named Situation Feature UTF Block

Situation feature UTF blocks are used in monitoring Situation Feature information during updating in response to new situation feature reports.

The inputs for the situation feature UTF block must be preceded by the line:

'BLOCK = ||NAME|| SITFEAT'

The structure of the situation feature UTF block is presented in Figure II-6. Its information elements consist of two action flag words corresponding to the situation features nuclear attack and chemical attack. Upon recognizing a new nuclear or chemical attack, the C^2I actions flagged in the coresponding word will be invoked.

The range of possible actions which can be invoked is as depicted in Figure II-5, above. Checking for nuclear or chemical threat contingencies (bit positions 23 or 24) would be natural actions.

- Range: 2^{10} different combinations of actions may be flagged
- Input Format: {<bit position index>,} (which turns on the bits in the specified bit positions)

3. Create Named Situation Representation UTF Block

Situation representation UTF blocks are used in monitoring Situation Representation information as it is updated or revised in response to new situation data.

The inputs for the situation representation UTF block must be preceded by the line:

"BLOCK = ||NAME|| SITREP'

The structure of the situation representation UTF block is presented in Figure II-7. Its information elements will now be discussed in terms of the two basic groups: thresholds and flags.

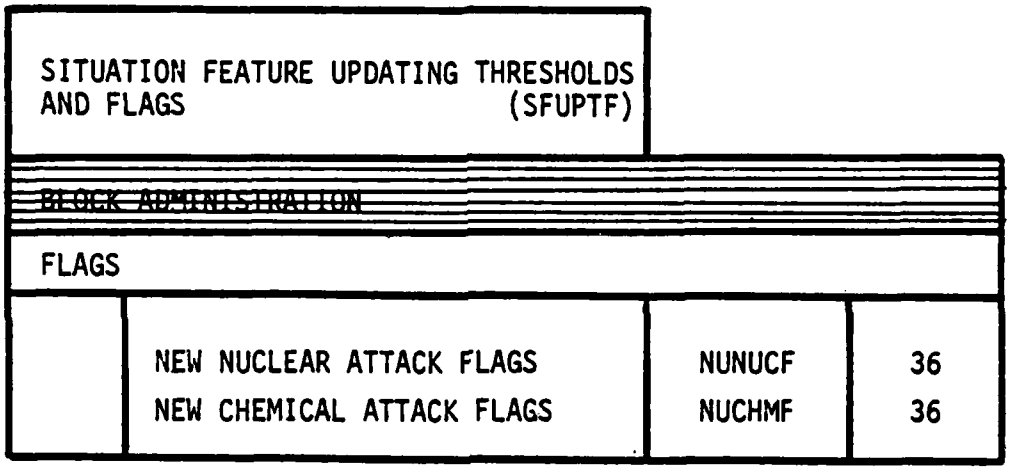

Figure II-6. Situation Feature UTF Block Structure

SITUATION REPRESENTATION UPDATING THRESHOLDS AND FLAGS (SRUPTF)

BLOCK ADMINISTRATION

THRESHOLDS

GROSS UNIT BALANCE INCREASE	GUBINT	18
_____"_____ DECREASE	GUBDCT	18
DETAILED UNIT BALANCE INCREASE	DUBINT	18
_____"_____ DECREASE	DUBDCT	18
STRENGTH BALANCE INCREASE	SBLINT	18
_____"_____ DECREASE	SBLDCT	18
NUCLEAR THREAT INDEX INCREASE	NTIINT	18
_____"_____ DECREASE	NTIDCT	18
CHEMICAL THREAT INDEX INCREASE	CTIINT	18
_____"_____ DECREASE	CTIDCT	18

FLAGS

GROSS UNIT BALANCE INCREASE	GUBINF	36
_____"_____ DECREASE	GUBDCF	36
DETAILED UNIT BALANCE INCREASE	DUBINF	36
_____"_____ DECREASE	DUBDCF	36
STRENGTH BALANCE INCREASE	SBLINF	36
_____"_____ DECREASE	SBLDCF	36
NUCLEAR THREAT INDEX INCREASE	NTIINF	36
_____"_____ DECREASE	NTIDCF	36
CHEMICAL THREAT INDEX INCREASE	CTIINF	36
_____"_____ DECREASE	CTIDCF	36

Figure II-7. Situation Representation UTF Block Structure

a. Situation Representation UTF Block Thresholds

Threshold information elements in the situation representation UTF block represent "operationally significant" levels of change in force balance or threat information elements. The significance of changes beyond the specified levels is that certain associated C^2I actions are implemented as specified in flags words corresponding to the thresholds.

Figure II-8 characterizes the situation representation UTF block thresholds in terms of: (1) the test made and triggering condition under which the corresponding actions will be invoked; (2) the range of the threshold; (3) a typical value for the threshold; (4) the input format for the threshold. Each time Situation Representation information is updated or revised, all tests are made; actions associated with triggered test conditions are accumulated and invoked upon completion of the updating or revising.

b. Situation Representation UTF Block Flag Words

Associated with each of the situation representation UTF block thresholds is a word of flags corresponding to the various C^2I actions which are to be carried out in the event the test condition defined by the threshold is triggered.

The range of possible actions which can be invoked is as presented in Figure II-5, above.

- Range: 2^{10} different combinations of actions may be flagged
- Input Format: {<bit position index>,} (which turns on the bit in the specified bit positions)

4. Create Named Threat Updating Parameters Block

Threat updating parameters blocks are used by C^2I elements as they revise their nuclear and chemical threat indices. Two types of parameters are involved: (1) a threat reduction parameter reflecting the extent to which the threat index declines over time in the absence of threat indicators; and (2) threat scaling factors reflecting the extent to which the threat index should be altered for each possible revision reason ("indicator"). Separate blocks of such parameters are required for nuclear threat updating and chemical threat updating.

THRESHOLD	TEST CONDITION WHICH TRIGGERS CORRESPONDING ACTION FLAGS	RANGE	TYPICAL VALUE	INPUT FORMAT
GROSS UNIT BALANCE INCREASE	< NEW BALANCE/OLD BALANCE	0.00-10.00	1.70	REAL
GROSS UNIT BALANCE DECREASE	> NEW BALANCE/OLD BALANCE	0.00-10.00	.50	REAL
DETAILED UNIT BALANCE INCREASE	< NEW BALANCE/OLD BALANCE	0.00-10.00	1.20	REAL
DETAILED UNIT BALANCE DECREASE	> NEW BALANCE/OLD BALANCE	0.00-10.00	.90	REAL
STRENGTH BALANCE INCREASE	< NEW BALANCE/OLD BALANCE	0.00-10.00	1.10	REAL
STRENGTH BALANCE DECREASE	> NEW BALANCE/OLD BALANCE	0.00-10.00	.95	REAL
NUCLEAR THREAT INDEX INCREASE	< NEW INDEX/OLD INDEX	0.00-10.00	1.10	REAL
NUCLEAR THREAT INDEX DECREASE	> NEW INDEX/OLD INDEX	0.00-10.00	.75	REAL
CHEMICAL THREAT INDEX INCREASE	< NEW INDEX/OLD INDEX	0.00-10.00	1.10	REAL
CHEMICAL THREAT INDEX DECREASE	> NEW INDEX/OLD INDEX	0.00-10.00	.75	REAL

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Figure II-8. Characterization of Situation Representation UTF Block Threshold

The inputs for each threat updating parameters must be preceded by the line:

'BLOCK = || NAME || THREAT'

The structure of the threat updating parameters block is presented in Figure II-9. Its information elements will now be discussed.

a. Threat Reduction Factor

Reflect the extent to which the corresponding threat index declares over time in the absence of specific revision reasons. In particular, the threat reduction factors are used to scale down the threat index by:

$$\left(\frac{1}{(1 + (\text{TIME ELAPSED} * \text{THREAT REDUCTION FACTOR}))}\right)$$

which reflects the postulate that the threat index decreases though at a decreasing rate over time.

- Range: 0.00 - 40.95
- Input Format: Real

b. Threat Scaling Factor for Revision Reason i

Prescribes the extent to which the threat index should be multiplicatively scaled up or down in response to the i^{th} revision reason. At present, such a scaling factor must be provided for 15 distinct revision reasons. If a revision reason in interpreted as a particular type of threat indicator and the threat index is interpreted as the odds of threat materialization, then the threat scaling factors can be interpreted as the likelihood ratios associated with the revision reasons.

- Range: 0.01 - 40.00 (must be strictly positive)
- Input Format: Real

5. Create Named UTF Directories

Once appropriate named UTF blocks of the various types have been created, they can be consolidated into named UTF directories. To create a specific named UTF directory, all UTF block references must be preceded by the line:

'DIRECTORY = || NAME || '

THREAT UPDATING PARAMETERS BLOCK (TUPBLK)			
INFORMATION BLOCK ADMINISTRATION			
THREAT INDEX REDUCTION INFORMATION			
	THREAT REDUCTION FACTOR	THREDF	12
THREAT INDEX REVISION SCALING FACTORS			
	THREAT SCALING FACTOR FOR REVISION REASON 1	THSFØ1	12
	2		12
	3		12
	4		12
	• 5	•	12
	• 6	•	12
	• 7	•	12
	8		12
	9		12
	10		12
	11		12
	12		12
	13		12
	14		12
	THREAT SCALING FACTOR FOR REVISION REASON 15	THSF15	12

Figure II-9. Threat Updating Parameters Block

References to specific named UTF blocks can then be inserted into this named directory by lines of the form

'SET <ENTRY TYPE> = ||NAME|| '

where:

<ENTRY TYPE> = BASIC OS/AGGREGATE OS/
BASIC EOB/AGGREGATE EOB/
SIT FEATURE/SITREP/
NUCLEAR THREAT/CHEMICAL THREAT

and,

||NAME|| refers to the previously created named UTF block to be referenced by the directory entry of the specified type.

Figure II-10 illustrates the structure of a UTF Directory.

C. CREATE NAMED CONCEPT OF OPERATION COMPONENTS

Concepts of operation guide C^2I elements as they attempt to develop operations to achieve objectives assigned by superior C^2I elements. A concept of operation provides generalized guidance to a C^2I element concerning one approach to carrying out the assigned mission. A C^2I element uses this generalized guidance by "fitting" or "specializing" the concept of operation to the specific features of the situation it faces: friendly and enemy forces information, assigned objectives, and so forth. Of course, a given concept of operation may or may not be appropriate in a particular situation. Thus, each C^2I element must be provided with several concepts of operation which it may consider, in turn, for applicability. (See the Modeling Description, Volume V, Chapter IV, for further discussion; see also the Software Description, Volume III, Chpater IV.)

As was discussed in the Software Description, Volume II, Chapter II, Section D, the concepts of operation provided to each C^2I element are organized into ordered sets. A particular set represents concepts generally applicable in a given broadly defined situation; at present, two sets of concepts are provided: one for offensive missions and one for

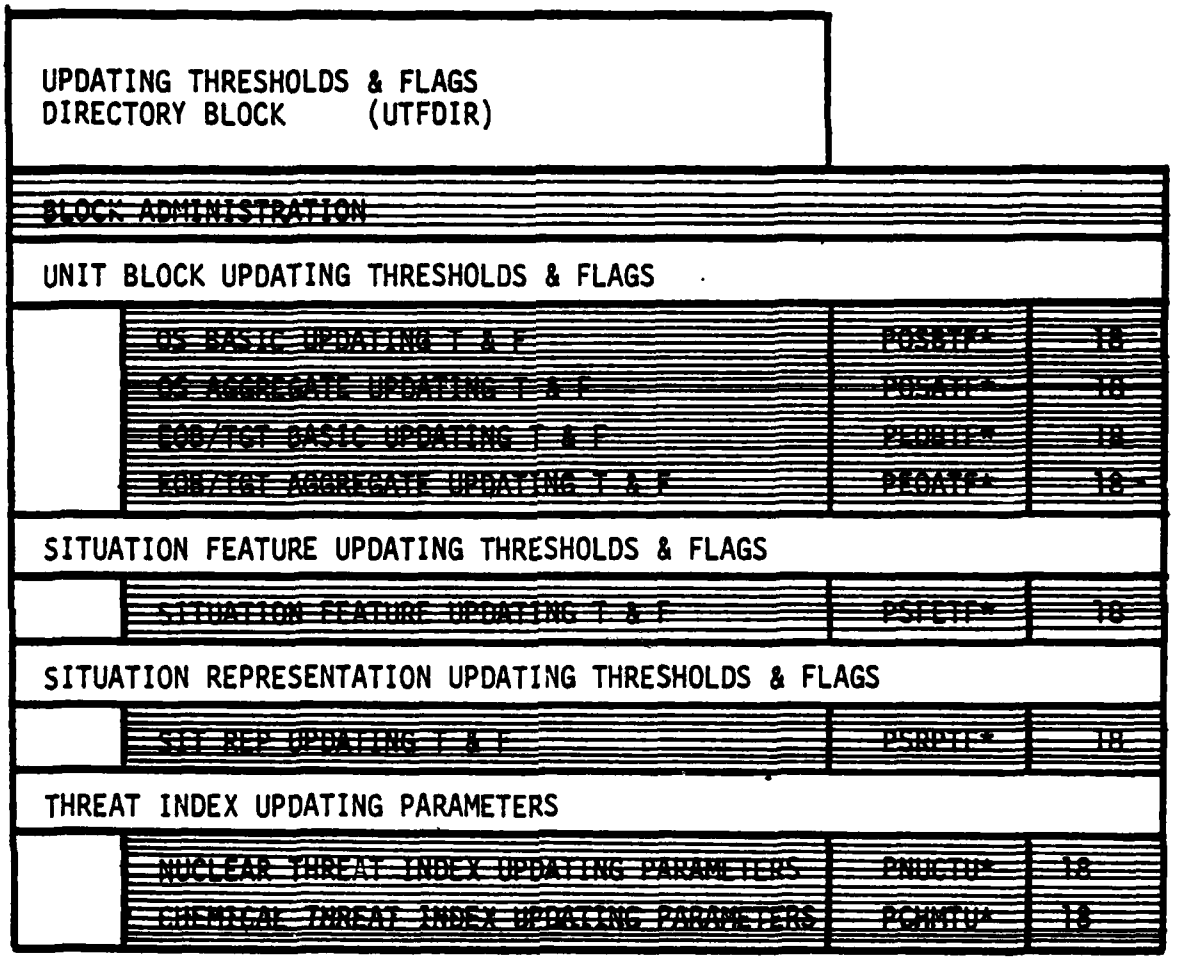


Figure II-10. Updating Thresholds and Flags (UTF) Directory Structure

defensive missions. Within each set, concepts are ordered in terms of general ("doctrinal") preference (in the sense that an envelopment is generally preferred to a penetration, which is, in turn, generally preferred to a frontal attack). These preferences guide the order in which concepts of operation are considered by C^2I elements. Within the model, this organization is implemented in the form of a "directory" of lists of concepts of operation as shown in Figure II-11. Each entry in the directory is a reference to a particular list of concepts of operation. Each list corresponds to one of the ordered sets of concepts. (Thus, at present, only the first two directory entries are used -- the others are provided for future growth.) Within each list, the doctrinal preference ordering is implemented by the accessing sequence of the list: the first concept on the list is the most preferred, the second concept is the next most preferred and so on. Each INWARS C^2I element (at echelons above division) must be provided access to an appropriate concept of operation directory.

Concepts of operation have been designed to be independent of echelon within INWARS C^2I elements: all echelons above division can utilize the same concept of, e.g., an envelopment. Thus, different concept directories need <u>not</u> be provided to C^2I elements at different echelons of command. Concepts of operation would typically vary between different sides, so two concept directories would generally be required.

Concept of operation directories are created in two basic steps. In the first step, the directories themselves are created and provided with references to lists of named concepts. In the second step, the named concepts included in the lists of the named directories are created. It is emphasized that although a particular named concept need be created only once (in the second step), it may be referenced by name in arbitrarily many of the directory lists. Thus, some concepts may appear in more than one list and/or directory -- for example, Blue and Red could share a single concept of "frontal attack", if desired.

Creation of concept of operation directories is initiated by the line:

'CONCEPT OF OPERATION'

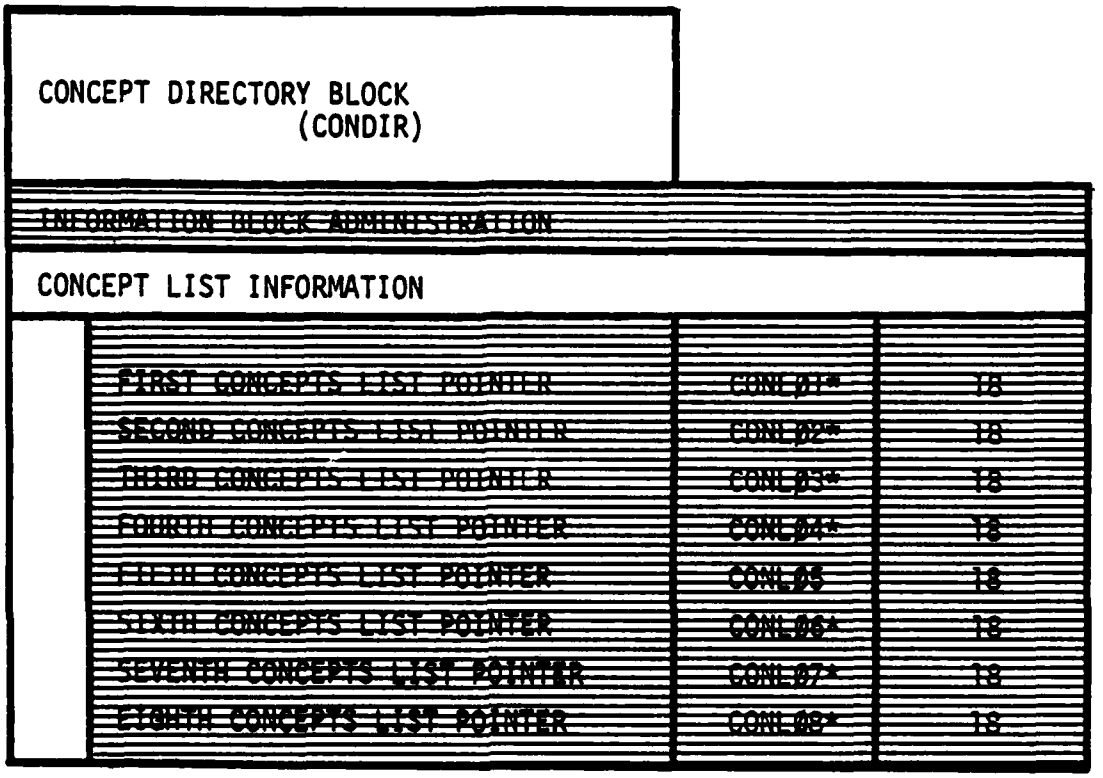


Figure II-11. Concept of Operation Directory Structure

Named directory specifications are then input. Finally, named concepts are created.

1. Create Named Concept Directories

To create a named concept directory, the specifications of included concept lists must be preceded by the line:

'DIRECTORY = || NAME|| '

which establishes the directory name. Concept lists are then created. The creation of the i^{th} concept list is initiated by the line:

'CONCEPT LIST i'

This line causes all following named concepts to be linked into the list referenced by the i^{th} concepts list pointer in the named concept directory (see Figure II-11, above). The concepts to be included in this particular list are then specified in order of doctrinal preference ("best" is specified first) by lines of the form:

'CONCEPT = || NAME|| '

2. Create Named Concepts

Creating named concepts of operation is perhaps the most elaborate of the C^2I input procedures due to the complexity of the concept information structure. The creation of a specific named concept is initiated by the line;

'CONCEPT = || NAME|| '

This line establishes the named concept as the context for subsequent inputs and creates a concept header having the structure portrayed in Figure II-12. Inputs for each concept must be terminated by an "END CONCEPT' line before another concept can be created.

a. Concept Header Block

As can be seen in the figure, the concept header block contains many information elements, only one of which is a direct input. For the most part, the header provides a repository for certain information concerning the concept as a whole.

Most important among those are the various necessary references (pointers) to other components of the concept: suitability conditions, operations parameters, the operation structure, and resource

CONCEPT HEADER BLOCK (CONHDR)		
INFORMATION BLOCK ADMINISTRATION		
BASIC CONCEPT INFORMATION		
CONCEPT DESIGNATOR	CONCPT	6
GENERIC CONCEPT POINTER	PGENCO*	18
SUITABILITY CONDITIONS		
SUITABILITY CONDITIONS POINTER	PSUITY*	18
OPERATION APPRAISAL INFORMATION		
ROLE STRUCTURE ADMISSIBILITY	ADMISS	9
DEPLOYMENT ACCEPTABILITY	ACCPTB	9
KERNEL VIABILITY	VIABIL	9
RESOURCE REASIBILITY	FEASBL	9
OVERALL DESIRABILITY	DESIRE	9
OPERATION TIMING INFORMATION		
OPERATION START TIME	STARTM	18
TIME OF LAST OPERATION MODIFICATION	LMODTM	18
TIME OF LAST RESOURCE ADJUSTMENT	LADITM	18
TIME OF LAST REPORT	LRPTTM	18
OPERATION PARAMETERS INFORMATION		
OPERATION PARAMETER BLOCK POINTER	PPARAM*	18
OPERATION STRUCTURE INFORMATION		
OPERATION STRUCTURE POINTER	PSTRUC*	18
RESOURCE MANAGEMENT INFORMATION		
OPERATIVE RES. MGT. BLOCK POINTER	POPRRM*	18
"NEW" RES. MGT. BLOCK POINTER	PNEWRM*	18

Figure II-12. Concept Header Block Information Structure

management blocks. References to these components are inserted into the concept header as they are created in subsequent inputs. As this suggests, the concept header may be regarded as the "root" of the information structure.

Other information elements in the header are developed during operations development processing in the model. Operation appraisal and timing information exemplify this type of information element.

1) Concept Designator

The sole direct input to the concept header is the concept designator which is simply an integer which identifies the concept. It is not presently used by the model:

- Range: 0 - 63
- Input Format: Integer

b. Suitability Conditions

The suitability conditions associated with a concept of operation characterize the conditions under which it is suitable for application. As discussed below, various types of suitability conditions may presently be specified; each is specified by a suitability condition block defining the type condition, its applicability, and appropriate thresholds. Collectively, the suitability condition blocks are organized as a list attached to the concept header. Any number of suitability conditions may therefore be associated with a concept of operation.

To initiate the creation of the list of suitability conditions, the line:

'CONDITION'

must precede the inputs for each suitability condition block. These blocks have the structure portrayed in Figure II-13. Their inputs will now be discussed.

1) Condition Information

These two information elements concern the type and applicability of the suitability condition block.

SUITABILITY CONDITION BLOCK (CNDBCK)		
INFORMATION BLOCK ADMINISTRATION		
CONDITION INFORMATION		
SUITABILITY CONDITION TYPE	SUITYP	6
RELATIVE POSITION CRITERION	RELPSN	3
STRUCTURE INFORMATION		
NEXT CONDITION BLOCK POINTER	PNXCND*	18
STRENGTH THRESHOLDS		
LOW RELATIVE STRENGTH THRESHOLD	STRLO	18
HIGH RELATIVE STRENGTH THRESHOLD	STRHI	18
FORCE BALANCE THRESHOLDS		
LOW FORCE BALANCE THRESHOLD	BALLO	18
HIGH FORCE BALANCE THRESHOLD	BALHI	18
NUCLEAR THREAT INDEX THRESHOLDS		
LOW NUCLEAR THREAT THRESHOLD	NTILO	18
HIGH NUCLEAR THREAT THRESHOLD	NTIHI	18
CHEMICAL THREAT INDEX THRESHOLDS		
LOW CHEMICAL THREAT THRESHOLD	CTILO	18
HIGH CHEMICAL THREAT THRESHOLD	CTIHI	18

Figure II-13. Suitability Condition Block

a) Suitability Condition Type

An integer code which specifies the type of suitability condition in the sense of what test to make on the situation and how to utilize the parameters in the block in making the test. At present, six types of suitability conditions can be specified: (1) gross strength, (2) subordinate strength, (3) overall unit balance, (4) subordinate unit balance, (5) nuclear threat, and (6) chemical threat.

- Range: 0 - 63 (1-6 presently used)
- Input Format: GROSS STR/SUB-STR/
  GROSS BAL/SUB-BAL/
  NUC-THRT/CHM-THRT

b) Relative Position Criterion

A set of three flags which limit the applicability of suitability conditions dealing with subordinate status to subordinates in designated relative positions ("left", "interior", or "right"), can be used, e.g., to impose a force balance condition which applies only to the left-most subordinate.

- Range: 2^3 distinct combinations possible
- Input Format: {<LEFT/INTERIOR/RIGHT>,}

2) Condition Thresholds

The suitability condition block provides space for a pair of thresholds defining an interval on some situation information element over which the concept is considered "suitable". Since different types of suitability conditions concern different types of situations, the thresholds must be interpreted correspondingly.

a) Strength Thresholds

Upper and lower thresholds defining the interval of relative or fractional strength (with respect to normal "full" or "TOE" strength) over which the concept is suitability:

- Range: 0 - 100
- Input Format: Real

b) Force Balance Thresholds

Upper and lower thresholds defining an interval of detailed unit balance over which the concept is "suitable".

- Range: 0.00 - 40.00
- Input Format: Real

c) Nuclear/Chemical Threat Index Thresholds

Upper and lower thresholds defining an interval of nuclear or chemical threat over which the concept is "suitable".

- Range: 0.00 - 40.00
- Input Format: Real

c. Operation Parameters

A concept is further characterized by various parameters involved in the development and execution of operations under that concept. These parameters are organized into a fixed block having the structure portrayed in Figure II-14. The line:

'OPERATION PARAMETERS'

initiates the procedure to receive the operation parameter inputs which will now be discussed.

1) Operation Appraisal Weighting Factors

These information elements represent the relative importance of various appraisal results to the overall appraisal of the concept. They are expressed as weights used to aggregate the corresponding appraisal results into broader appraisals.

a) Resource Weighting Factors

Weight reflecting the relative importance of individual types of resources -- CAS, interdiction, nuclear and chemical weapons, supplies, and replacements -- to the concept. Used to aggregate feasibility appraisals of individual resource types into an overall appraisal of resource feasibility.

- Range: 0.00 - 5.00
- Input Format: Real

OPERATION PARAMETERS BLOCK (PARBLK)			
INFORMATION BLOCK ADMINISTRATION			
OPERATION APPRAISAL WEIGHTING FACTORS			
	CAS WEIGHTING	CASWT	9
	INTERDICTION WEIGHTING	INTWT	9
	NUCLEAR WEAPONS WEIGHTING	NUCWT	9
	CHEMICAL WEAPONS WEIGHTING	CHMWT	9
	SUPPLY WEIGHTING	SUPWT	9
	REPLACEMENT WEIGHTING	RPLWT	9
	ROLE STRUCTURE ADMISSIBILITY WEIGHTING	ADMIWT	9
	DEPLOYMENT ACCEPTABILITY WEIGHTING	ACCPWT	9
	KERNEL VIABILITY WEIGHTING	VIABWT	9
	RESOURCE FEASIBILITY WEIGHTING	FEASWT	9
OPERATION APPRAISAL MINIMUM LEVELS			
	MINIMUM ROLE STRUCTURE ADMISSIBILITY	MNADMI	9
	MINIMUM DEPLOYMENT ACCEPTABILITY	MNACCP	9
	MINIMUM KERNEL VIABILITY	MNVIAB	9
	MINIMUM RESOURCE FEASIBILITY	MNFEAS	9
	MINIMUM OVERALL DESIRABILITY	MNDESR	9
OPERATION PROGRESS APPRAISAL INFORMATION			
	UPPER FORWARD OPERATION PROGRESS THRESHOLD	UPFWDP	4
	LOWER FORWARD OPERATION PROGRESS THRESHOLD	LOFWDP	4
	UPPER KERNEL OPERATION PROGRESS THRESHOLD	UPKERP	4
	LOWER KERNEL OPERATION PROGRESS THRESHOLD	LOKERP	4
	ADVANCE TO NEXT PHASE THRESHOLD	ADVNPT	7
	• • •		

Figure II-14. Operation Parameter Block Structure

	• • •		
OPERATIONS PARAMETERS BLOCK (PARBLK)			
	FWD GOOD, KER GOOD OPNS DEVEL ACTIONS	FGKGOD	15
	FWD GOOD, KER GOOD WPNS EMPLOY ACTIONS	GDKGWE	6
	FWD GOOD KER OK		
	FWD GOOD, KER OK		
	FED GOOD, KER POOR		
	FWD GOOD, KER POOR		
	FWD OK, KER GOOD		
	FWD OK, KER GOOD		
	FWD OK, KER OK	• • •	• • •
	FWD OD, KER OK		
	FWD OK, KER POOR		
	FWD OK, KER POOR		
	FWD POOR, KER GOOD		
	FWD POOR, KER GOOD		
	FWD POOR, KER OK		
	FWD POOR, KER OK		
	FWD POOR, KER POOR	FPKPOD	15
	FWD POOR, KER POOR	FPKPWE	6
CRITICAL SITUATION DIAGNOSIS INFORMATION			
	CRITICAL FORWARWARD OPERATION PROGRESS THRESH.	CRFWDP	4
	CRITICAL FORWARD OPERATION FAILURE LEVEL	CRFWFL	7
	CRITICAL KERNEL OPERATION PROGRESS THRESH.	CRKERP	4
	CRITICAL KERNEL OPERATION FAILURE LEVEL	CRDELF	7
	CRITICAL FRACTIONAL STRENGTH	CRFRST	7
	CRITICAL UNIT BALANCE	CRUBAL	12
	CRITICAL NUCLEAR THREAT	CRNUCT	12
	CRITICAL CHEMICAL THREAT	CRCHMT	12
	CRITICAL SITUATION MASK	CRSMSK	12

Figure II-14. Operation Parameter Block Structure (Continued)

b) Appraisal Weighting Factors

Weights reflecting the relative importance of specific attributes of a developed operation -- role structure admissibility, deployment acceptability, kernel viability, and resource feasibility -- to the overall desirability of the operation. Used to aggregate detailed appraisals of these attributes into an appraisal of overall operation desirability.

- Range: 0.00 - 5.00
- Input Format: Real

2) Operation Appraisal Minimum Levels

Minimum acceptable limits on attributes of a developed operation -- role structure admissibility, deployment acceptability, kernel viability, resource feasibility, and overall desirability. If appraisals of these attributes exceed the specified minimum levels, the developed operation is judged acceptable and may be implemented without considering any other concepts. An unacceptable appraisal of any of these attributes may cause the development of the operation to be halted and the considerations to shift to the next concept of operation.

- Range: 0.00 - 5.00
- Input Format: Real

3) Operation Progress Appraisal Information

These information elements represent various thresholds used in qualitatively appraising the progress of an ongoing operation.

a) Operation Progress Thresholds

Upper and lower thresholds which define normal ("ok") progress of: (1) the overall forward operation, and (2) the kernel operation (consisting only of key roles). Above the upper thresholds, progress is considered exceptionally good ("good"); below the lower thresholds, progress is considered exceptionally poor ("poor").

- Range: 0 - 10 (10 = success)
- Input Format: Integer

b) Advance-to-Next-Phase Threshold

The minimum fraction of forward roles (weighted by their role weights) which must be ready to advance to the next phase of their individual operations before the overall operation can be advanced as a whole to its next phase.

- Range: 000 - 1.00
- Input Format: Real

4) Operation Progress Action Information

These information elements represent basic actions to be taken under various combinations of forward operation progress ("good", "ok", or "poor") and kernel operation progress ("good", "ok", or "poor") -- joint progress states. Two types of actions are specified: (1) operations development actions, and (2) weapons employment actions. The actions are specified by strings of flags, one for each type of action. A pair of flag strings must be provided for each of the nine possible joint progress states (forward good/kernel good,... forward poor/kernel poor).

a) Operations Development Actions

Possible operations development actions which may be specified as the response to a particular joint progress state are: (1) advancing the overall operation to its next phase; (2) committing reserves in the on-going operation, (3) adjusting resource allocations in the on-going operation; and, (5) developing a new operation. Implementation of all but the first action may be left to the discretion of the development process themselves or may be "forced". Multiple actions may also be specified provided that no intermediate actions are forced.

- Range: 2^9 combinations may, in principle, be specified
- Input Format: {<ADV-NXT-PHASE/
  COMMIT-RESRVS/IMPL-COMMIT/
  ADJUST-RESOURCE/IMPL-ADJUST/
  MODIFY-OPN/IMPL-MOD/
  DEVELOP-NEW/IMPL-NEW>,}

b) Weapons Employment Actions

Possible weapons employment actions which may be specified as the response to a particular joint progress state are: (1) consider employment of conventional weapons (interdiction); (2) consider employment of nuclear weapons; and (3) consider employment of chemical weapons. Note that the action is merely to consider employment -- consideration need not result in an employment. Any or all of these actions may be specified.

- Range: 23 distinct combinations may be specified
- Input Format: {<CONVEN/NUC/CHM>,}

5) Critical Situation Diagnosis Information

These information elements represent thresholds on various situation information elements which define critical conditions. Also included is a critical situation mask which is used in assessing which critical conditions constitute a "critical situation".

a) Critical Operation Progress Thresholds

Thresholds on forward and kernel operation progress below which the corresponding operation is in a critical condition.

- Range: 0 - 10
- Input Format: Integer

b) Critical Operation Failure Thresholds

Fractions of roles in the forward and kernel operations (weighted by their role weight) whose individual operations have failed. If more than this fraction has failed, the corresponding operation is in a critical condition.

- Range: 0.00 - 1.00
- Input Format: Real

c) Critical Fractional Strength

Fraction of nominal full or TOE strength below which the overall force is in a critical condition.

- Range: 0.00 - 1.00
- Input Format: Real

d) Critical Unit Balance

Threshold on detailed unit balance below which the overall force is in a critical condition.

- Range: 0.00 - 40.00
- Input Format: Real

e) Critical Threat

Thresholds on nuclear and chemical threat indices above which the overall force is in a critical condition.

- Range: 0.00 - 40.00
- Input Format: Real

f) Critical Situation Mask

A string of flags indicating which of the ground operations development actions should be considered in a critical situation (i.e., when one or more of the critical conditions defined above exist). May be used to eliminate certain minimal-impact actions (such as adjusting resources) in critical situation.

- Range: 2^9 combinations may, in principle, be specified
- Input Format: {<ADV-NXT-PHASE/
  COMMIT-RESRVS/IMPL-COMMIT/
  ADJUST-RESOURCE/IMPL-ADJUST/
  MODIFY-OPN/IMPL-MOD/
  DEVELOP-NEW/IMPL-NEW>,}

d. Resource Management Information

One important form of guidance provided in a concept of operation concerns that utilization of resources. Certain resource management parameters are contained in the Resource Management block having the structure presented in Figure II-15. The line:

'RESOURCE MANAGEMENT'

initiates the procedure to receive the resource management inputs.

It will be noted that of the various information elements contained in the resource management block, only the reservation scaling factors for the various types of weapons are input. Each reservation scaling factor reflects the relative importance of discretionary control of

RESOURCE MANAGEMENT BLOCK (MGTBLK)		
INFORMATION BLOCK ADMINISTRATION		
AIR SUPPORT MANAGEMENT		
ALLOCATED CAS RATE/DAY	ALLCAS	12
RESERVED CAS RATE/DAY	RESCRS	12
CAS RESERVATION SCALING FACTOR	CASRSF	12
RESERVED CAS STOCK/DAY REMAINING	CASREM	12
ALLOCATED INT RATE/DAY	ALLINT	12
RESERVED INT RATE/DAY	RESINT	12
INT RESERVATION SCALING FACTOR	INTRSF	12
RESERVED INT STOCK/DAY REMAINING	INTREM	12
WEAPONS MANAGEMENT		
ALLOCATED NUCLEAR WEAPONS	ALLNUC	12
RESERVED NUCLEAR WEAPONS	RESNUC	12
NUC RESERVATION SCALING FACTOR	NUCRSF	12
RESERVED NUCLEAR WEAPONS REMAINING	NUCREM	12
ALLOCATED CHEMICAL WEAPONS	ALLCHM	12
RESERVED CHEMICAL WEAPONS	RESCHM	12
CHEM RESERVATION SCALING FACTOR	CHMRSF	12
RESERVED CHEMICAL WEAPONS REMAINING	CHMREM	12
SERVICE SUPPORT MANAGEMENT		
AVAILABLE SUPPLY RATE	AVLSUP	12
AVAILABLE REPLACEMENT RATE	AVLRPL	12

Figure II-15. Resource Management Block Structure

the corresponding resource by the C^2I element. During operations development, reservation scaling factors are applied to "operational norm" reservation factors (from the developing C^2I elements' SOP information -- see Section A.2.a (1), above) to determine reservations of the various resources.

- Range: 0.00 - 10.00
- Input Format: Real

Additional inputs related to resource management -- in particular, the allocation of resources among subordinates -- are contained in the resource allocation blocks associated with the roles in the operation (See Section II.C.2.g.(3), below.).

e. Operations Structure

The "heart" of a concept of operation is its operation structure. It is in the operation structure that the roles, phases, and operations of the concept are characterized. These various operation components are linked together into a matrix-like structure as shown in Figure II-16. Procedures to input these blocks or "nodes" will be discussed in the following sections. These procedures are initiated by the line:

'OPERATION STRUCTURE'

This creates an Operation Structure block having the structure portrayed in Figure II-17. Note that none of its information elements are direct inputs. Rather they provide a repository for accessing references, (i.e., pointers) to the various role blocks, phase blocks and other elements which make up the operation structure. The operation structure block is, in effect, the "root" of the operation structure.

f. Phases

The phases of a concept of operation characterize its progress over time in the form of specific operational "milestones". The overall phasing of a concept is represented by a list of phase blocks having the structure shown in Figure II-18. The list is created by sequentially inputing appropriate phase blocks. Each phase block's inputs must be preceded by the line

"PHASE i'

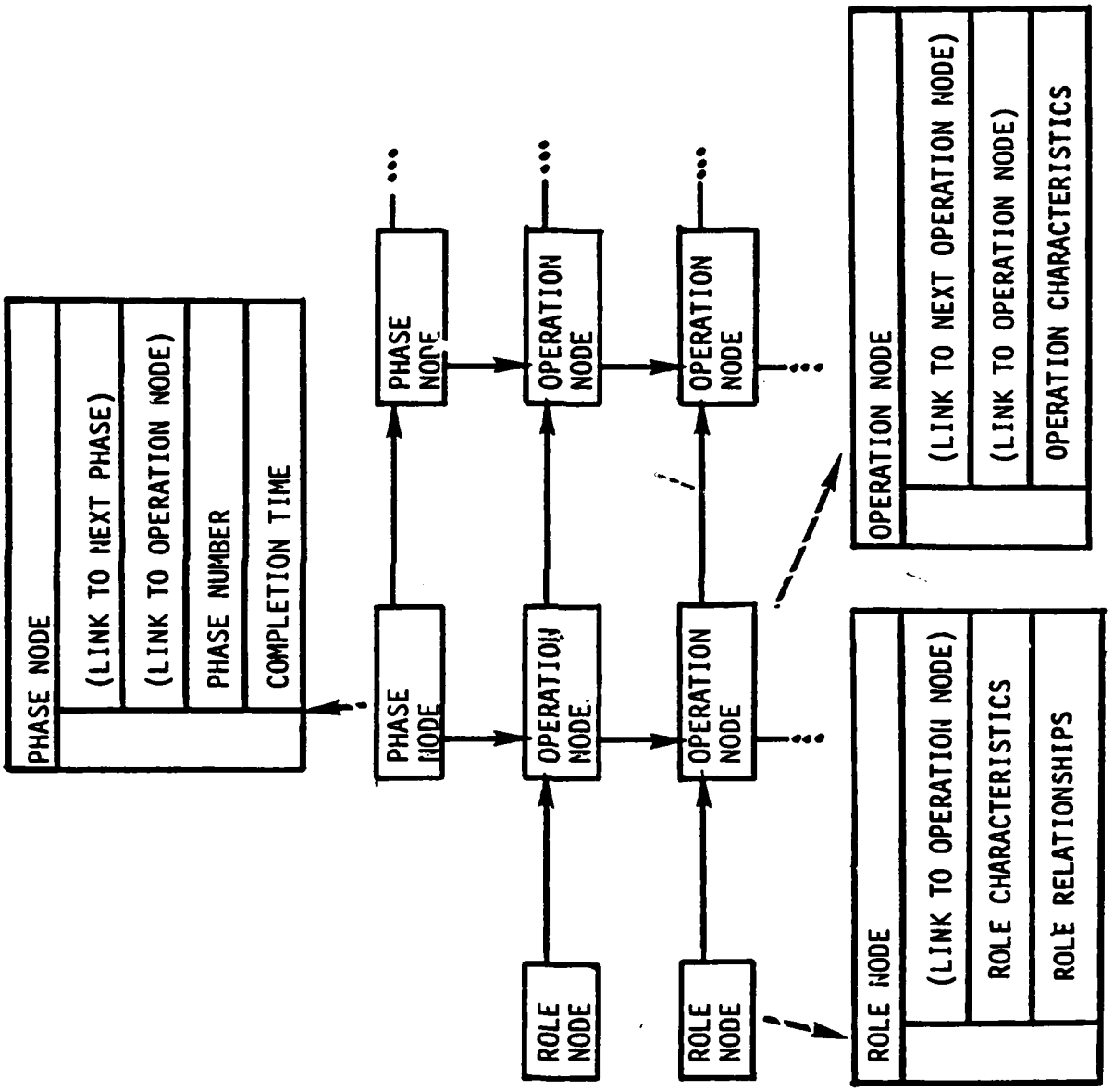


Figure II-16. Operation Structure

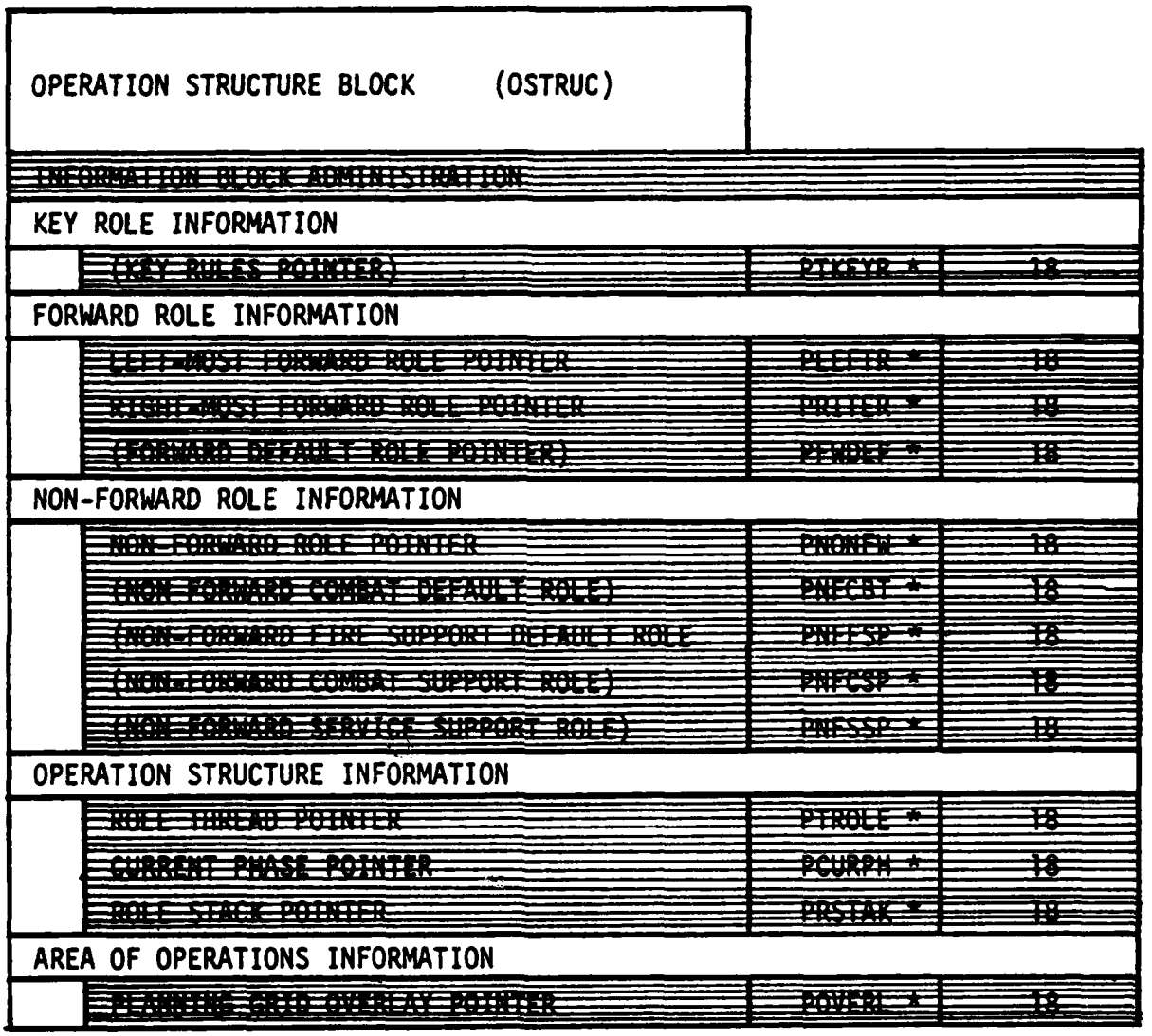


Figure II-17. Operation Structure Block Structure

PHASE BLOCK (PHSBLK)		
INFORMATION BLOCK ADMINISTRATION		
BASIC PHASE INFORMATION		
PHASE NUMBER	PHSNUM	4
PHASE TYPE	PHSTYP	3
PHASE CONTROL INFORMATION		
PROGRESS	PRGRSS	4
PHASE COMPLETION TIME ESTIMATE	COMPTM	18
STRUCTURE INFORMATION		
NEXT PHASE POINTER	PNXPHA *	18
PHASE OPERATIONS POINTER	PPHOPN *	18

Figure II-18. Phase Block Structure

for some integer i representing the ordinal number of that phase relative to the comtemplated phase execution sequence. The specific inputs will now be discussed.

1) Basic Phase Information

These information elements characterize the phase itself.

a) Phase Number

The ordinal number of the phase relative to the expected sequence of execution of all phases in the concept; entered via the 'PHASE i' line.

b) Phase Type

An indication of the type of the phase (e.g., "set-up" vs "advance-to-contact", etc.). (Not presently used by the model.)

- Range: 0 - 7
- Input Format: Integer

2) Phase Control Information

These information elements represent expected and actual progress in the execution of the phase. They are not input, but are rather set during execution of an operation (in local copies of the phase block.).

g. Roles

The roles of a concept of operation represent the basic functions to be carried out by the force elements involved in the concept. Individual roles are represented by Role blocks having the structure presented in Figure II-19. Associated with each role is a sequence of individual operation blocks correlated with the phase blocks and prescribing what that role is to be doing in each phase contemplated in the concept. Also associated with each role is guidance concerning the relative priority of that role for the various types of resources. Finally, it is necessary to characterize certain distinguished groups of roles (key roles, forward roles, default roles), and to establish operational associations between certain roles.

ROLE BLOCK (ROLBLK)		
INFORMATION BLOCK ADMINISTRATION		
BASIC ROLE INFORMATION		
ROLE DESIGNATOR	ROLDES	4
ROLE TYPE	ROLTYP	6
KEY ROLE INDICATOR	KEYROL	1
ASSOCIATE ROLE INDICATOR	ASSOCR	1
FORWARD ROLE INDICATOR	FWDROL	1
ROLE WEIGHT	ROLEWT	9
GENERIC ROLE POINTER	PGENRO*	18
ROLE ACTOR CRITERIA		
FORCE ELEMENT ACTOR TYPE	ACTYPE	3
FORCE ELEMENT RELATIVE POSITION	RELPSN	3
DESIRED FRACTIONAL STRENGTH	FRASTR	7
DESIRED FORCE BALANCE	BALDES	12
ROLE OPERATION INFORMATION		
LATERAL DEPLOYMENT IN PLANNING GRID	LATDPL	7
SECTOR WIDTH IN PLANNING GRID	SECWID	7
ACTIVE OPERATION POINTER	PTROPN*	18
OPERATIVE RESOURCE ALLOCATION BLOCK	PTRRES*	18
"NEW" RESOURCE ALLOCATION BLOCK	PTRNEW*	18
ASSOCIATE ROLE INFORMATION		
LEFT ROLE POINTER	PTLEFT*	18
LEFT ASSOCIATE ROLE FLAG	LEFTAS	1
RIGHT ROLE POINTER	PTRITE*	18
RIGHT ASSOCIATE ROLE FLAG	RITEAS	1
RESERVE ROLE POINTER	PTRSRV*	18
RESERVE ASSOCIATE ROLE FLAG	RSRVAS	1
NEXT ROLE POINTER	PNXTRO*	18
ACTOR INFORMATION		
ACTOR UNIT ID	UNITID	18
ACTOR OWN STATUS BLOCK POINTER	PTROS*	18
SCRATCH PAD SPACE		

Figure II-19. Role Block Structure

To initiate the procedures for role inputs, the line:

'ROLE = ||NAME|| '

must precede all inputs. This is followed by Role block inputs (subsection (1), below), corresponding operation block inputs (subsection (2), below) and resource allocation block inputs (subsection (3), below). Finally role characterizations and associations are established (subsection (4), below). In naming roles, it is natural to use, e.g., "MAIN ATTACKER" or "GENERAL RESERVE" in several different operations. However this would violate the requirement that a single name refer to only one block. Thus, it is suggested that an abbreviation of the operation name (e.g., 'ENV' for envelopment) be attached to common names (e.g., MAIN ATTACKER/ENV).

1) Role Block Inputs

Inputs to the Role block presented in Figure II-19 are described in this subsection.

a) Basic Role Information

These information elements concern the nature of the role and its relative importance in the operation.

1. Role Designator

An integer which uniquely designates the role within the operation. (Not presently used in the model).

- Range: 0 - 15
- Input Format: Integer

2. Role Type

An integer which reflects the type of the role (not presently used by the model).

- Range: 0 - 63
- Input Format: Integer

3. Role Type Indicators

Flags indicating whether the role is a key role, associate role, and or forward role. They are not input directly, but are rather established by means of "Role Characterization Statements" as discussed below (Section C.2.g.(4).(a).

4. Role Weight

An indication of the relative importance of the role within the overall operation--used to reflect this importance in various C^2I processes.

- Range: 0.00 - 5.00
- Input Format: Real

b) Role Actor Criteria

These information elements represent attributes which are required or desired of any force element assigned to fill the role.

1. Force Element Actor Type

The type of force element required to fill the role.

- Range: N/A
- Input Format: GND-CBT/GND-FIRE-SPT/
  GND-CBT-SPT/GND-SVC-SPT/
  AIR-CBT/AIR-FIRE-SPT/
  AIR-CBT-SPT/AIR-SVC-SPT

2. Force Element Relative Position

A set of three flags specifying the relative position ("left", "interior", or "right") required of a force element to fill the role. Any or all flags may be set.

- Range: 2^3 distinct combinations may be specified
- Input Format: {<LEFT/INTERIOR/RIGHT>,}

3. Desired Fractional Strength

A lower limit on the fractional strength desired--not required--of a force element (with respect to its nominal "full" or "TOE" strength) in order to properly fill the role.

- Range: 0.00 - 1.00
- Input Format: Real

4. Desired Force Balance

A lower limit on the detailed unit balance desired--not required--of a force element in order to properly fill the role.

- Range: 0.00 - 40.00
- Input Format: Real

c) Role Operation Information

These information elements represent various aspects of the operations of the role within the overall operation. Some are set during operations development (e.g., "Lateral Development in Planning Grid") and some provide for references to blocks created later in the input process (e.g., "Active Operation Pointer").

1. Sector Width in Planning Grid

The desired sector width within the overall standard planning grid to be covered by a nominally "full" strength force element filling this role. Adjusted during operations development to account for actual strength.

- Range: 0 - 100 planning grid units
- Input Format: Integer

d) Associate Role Information

These information elements represent various operational associations between different roles in the operation. They are not input directly, but are rather established by means of Role Association Statements as discussed below (Section C.2.g.(4).(b).).

e) Actor Information

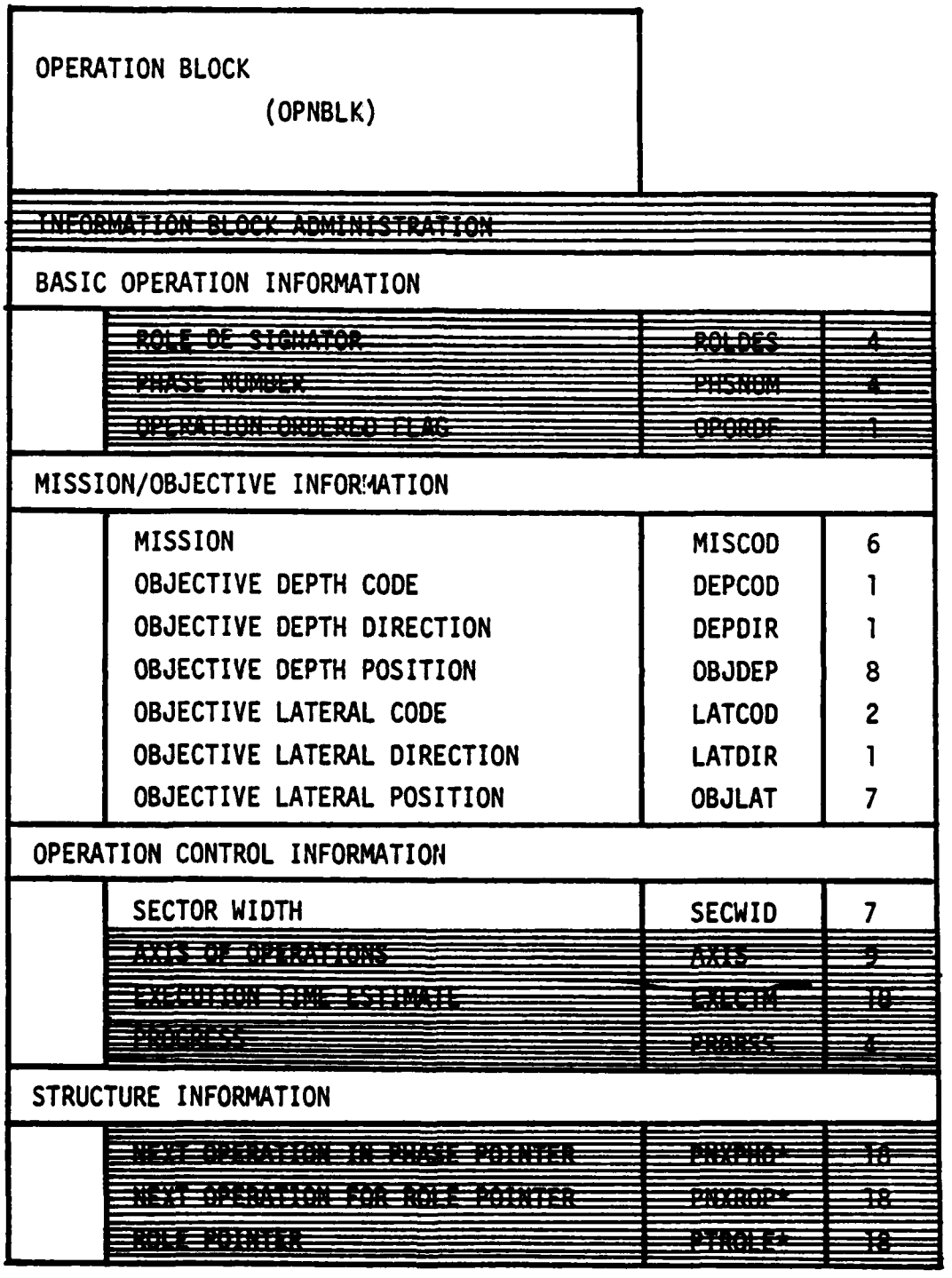
These information elements specify a particular force element assigned to fill the role. They are not input at all, but are rather set during operations development activities (in local copies of the role block).

2) Role Operations

A role's individual operations in a concept of operation are represented by a sequence of Operation blocks having the structure presented in Figure II-20. One operation block must be provided for each phase in the operation. The line:

'OPERATION IN PHASE i'

initiates the procedure to input the role's operation block for the i^{th} phase in the concept. Specific inputs will now be described.



OPERATION BLOCK (OPNBLK)		
INFORMATION BLOCK ADMINISTRATION		
BASIC OPERATION INFORMATION		
ROLE DESIGNATOR	ROLDES	4
PHASE NUMBER	PHSNUM	4
OPERATION ORDERED FLAG	OPORDF	1
MISSION/OBJECTIVE INFORMATION		
MISSION	MISCOD	6
OBJECTIVE DEPTH CODE	DEPCOD	1
OBJECTIVE DEPTH DIRECTION	DEPDIR	1
OBJECTIVE DEPTH POSITION	OBJDEP	8
OBJECTIVE LATERAL CODE	LATCOD	2
OBJECTIVE LATERAL DIRECTION	LATDIR	1
OBJECTIVE LATERAL POSITION	OBJLAT	7
OPERATION CONTROL INFORMATION		
SECTOR WIDTH	SECWID	7
AXIS OF OPERATIONS	AXIS	9
EXECUTION TIME ESTIMATE	EXECTM	19
PROGRESS	PROGRS	4
STRUCTURE INFORMATION		
NEXT OPERATION IN PHASE POINTER	PNXPHO*	16
NEXT OPERATION FOR ROLE POINTER	PNXROP*	16
ROLE POINTER	PTROLE*	16

Figure II-20. Operation Block Structure

a) Basic Operation Information

These information elements characterize basic aspects of the operation. They are not directly input, but are rather established by the role and phase contexts in which the operation block is created. (The "Operation Ordered Flag" is used in the implementation of an operation developed under the concept.)

b) Mission/Objective Information

These information elements characterize the mission and objective of the operation in generalized form.

1. Mission

An integer code designating the particular mission to be accomplished in performing the operation specified by the operation block.

- Range: 0 - 63
- Input Format: Integer

2. Objective Depth Code

A code indicating whether "Objective Depth Position" information (see below) is to be interpreted as: (1) an absolute depth in the standard planning grid, or (2) a relative depth in planning grid units with respect to the absolute depth of a related role's objective.

- Range: N/A
- Input Format: ABSOLUTE/RELATIVE

3. Objective Depth Direction

A code indicating whether a relative depth (see above) is to be interpreted as ahead-of or behind the absolute depth of the related role's objective. (Applies only when the depth code = RELATIVE.)

- Range: N/A
- Input Format: AHEAD-OF/BEHIND

4. Objective Depth Position

A depth in the standard planning grid units used in setting the depth of the operation's objective. May be interpreted

as an absolute depth or a relative depth ahead-of or behind a related role's objective (depending on the depth code and depth direction as discussed above).

- Range: 0 - 200 planning grid units
- Input Format: Integer

5. Objective Lateral Code

A code indicating whether "Objective Lateral Position" information (see below) is to be interpreted as: (1) an absolute lateral position in the standard planning grid, (2) a displacement laterally from the role's initial lateral deployment line, (3) a relative lateral position with respect to the lateral position of a related role's objective, or, (4) an open lateral position to be set based on the needs of the operation.

- Range: N/A
- Input Format: ABSOLUTE/DISPLACMENT/ RELATIVE/OPEN

6. Objective Lateral Direction

A code indicating whether a displacement or relative lateral position is to be interpreted as left-of or right-of the reference position (initial lateral deployment or lateral position of related role's objective). Applies only when lateral code = DISPLACEMENT or RELATIVE.

- Range: N/A
- Input Format: LEFT-OF/RIGHT-OF

7. Objective Lateral Position

A lateral position (or distance) in standard planning grid units used in setting the lateral position of the operations objective. May be interpreted as an absolute lateral position, a displacement, or a relative position left-of or right-of a reference position (depending on the lateral code and lateral direction as discussed above).

- Range: 0 - 100 planning grid units
- Input Format: Integer

c) Operation Control Information

These information elements represent various aspects of executing and controlling an operation. Most are set during operation's development or execution/control processes and are, accordingly, not input. Guidance concerning sector width is input, however.

1. Sector Width

The desired sector width within the overall standard planning grid to be covered by a "full" strength force element conducting this operation. Adjusted during operation development to account for actual strengths.

- Range: 0 - 100 planning grid units
- Input Format: Integer

d) Structure Information

These information elements represent accessing relationships from the operation block to other operation blocks and to the role which carries it out. They are not input, but rather derive from the input structuring.

3) Role Resource Allocation

Guidance concerning the relative priority of a role for various types of resources is represented in an Allocation block having the structure presented in Figure II-21. Inputs to this block must be preceded by the line:

'RESOURCE ALLOCATION'

It will be noted that of the various information elements contained in the resource allocation block structure, only the scaling factors for the various types of resources are input. Each scaling factor reflects the relative priority of the corresponding role with respect to allocations of that resource type. During operations development, the scaling factors are applied to "operational norm" allocations of the resources (from the developing C^2I element's SOP information--see Section A. 2.a.(3), above) to determine desired allocations to subordinates.

- Range: 0.00 - 10.00
- Input Format: Real

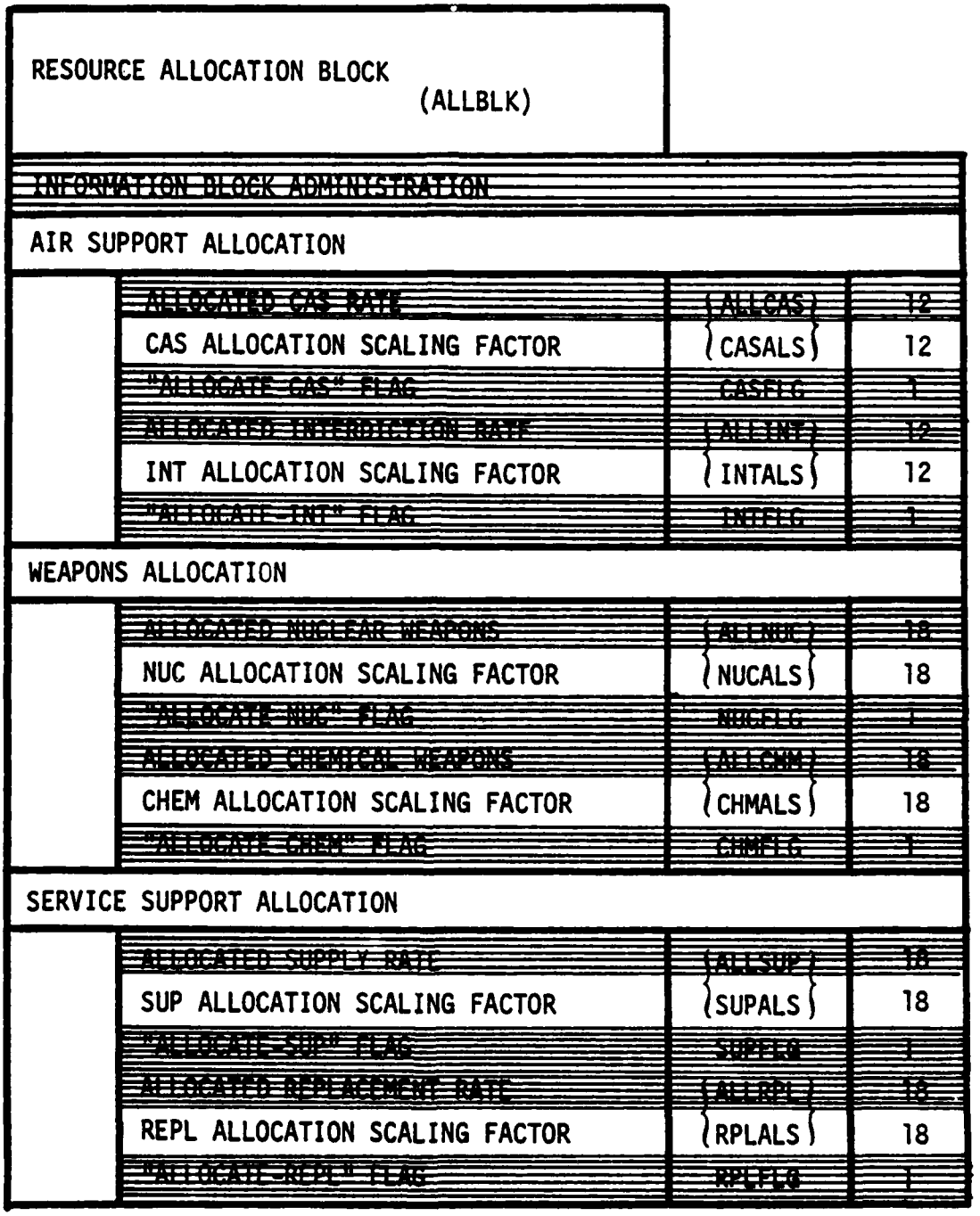


Figure II-21. Resource Allocation Block Structure

4) Role Characterizations and Associations

At this stage in the role input process, individual (named) roles have been created. It is now necessary to structure this set of roles in two ways. First, certain special types of roles must be distinguished (and made accessible via the operation structure block) for use in the operations development processes. Second, certain associations ("left", "right", or "reserve") between roles may be required to properly reflect operational relationships within the concept. The result of this structuring is a system of roles.

To create such a system, the existence of roles as named components is exploited. The names can be used in "role characterization statements" and "role association statements" which prescribe the necessary structuring. These statements must be preceded by the line:

ROLE STRUCTURE

to mitiate the proper processing.

a) Role Characterization Statements

Refering back to the operation structure block portrayed in Figure II-17, above, it will be noted that information elements are provided for references to various special types of roles: "key roles", "forward default role", "non-forward combat support role", and so forth. These distinguished roles (or sets of roles) play a special part in the operations development process.

To "attach" appropriate roles to these references, role characterization statements are used. Role characterization statements have the form:

' || NAME|| IS <DESCRIPTOR> ROLE'

where || NAME|| refers to a specific role, and <DESCRIPTOR> is defined as:

<DESCRIPTOR> = KEY/FORWARD [DEFAULT]/
NONFORWARD CBT DEFAULT/
NONFORWARD FIRESPT DEFAULT/
NONFORWARD CBTSPT DEFAULT/
NONFORWARD SVC SPT DEFAULT/

The result of such a role characterization statement is to link the named role into the appropriate slot in the operation structure block. In addition, certain role type indicator flags in the role block itself may be set in processing a role characterization statement.

b) Role Association Statements

Referring back to the role block portrayed in Figure II-19, above, it will be recalled that the Associate Role information elements represented operational linkages among different roles. To create such associations, role association statements are used. Role association statements have the form.

'<ASSOCIATION TYPE> ASSOCIATE OF || $NAME_1$ || IS || $NAME_2$ || '

where || $NAME_1$ || and || $NAME_2$ || refer to specific roles and <ASSOCIATION TYPE> is defined as:

<ASSOCIATION TYPE> = LEFT/RIGHT/RESERVE

The result of such a role association statement is to create a link (pointer) of the appropriate type (left, right, or reserve associate) from the role block || $NAME_1$ || to the role block || $NAME_2$ || .

h. Individual Concept Input Terminator

The inputs to each individual concept must be termined by the line

END CONCEPT

before another concept can be created by further inputs.

D. CREATE NAMED WEAPONS EMPLOYMENT CONCEPT COMPONENTS

Weapons employment concepts guide C^2I elements as they attempt to develop weapons employments in support of their operations. A weapons employment concept provides generalized guidance to a C^2I element concerning one approach to employing weapons; a C^2I element uses this guidance by "fitting" or "specializing" the employment concept to the specific features of the situation it faces: quantity and type of weapons available, targets acquired, and so forth. Of course, a given employment concept may or may not be appropriate in a particular situation. Thus, each C^2I element must

be provided with several weapons employment concepts. (See the Modeling Description, Volume V, Chapter V, and the Software Description, Volume III, Chapter V, for further discussion.)

As was discussed in the Software Description, Volume II, Chapter II, Section E, weapons employment concepts provided to each C^2I element are organized as ordered sets. A particular set represents concepts generally applicable in a given broadly defined situation. At present, four sets of weapons employment concepts are provided: (1) a singleton set for employment of conventional weapons (interdiction) under normal nuclear/chemical threat; (2) a singleton set for employment of conventional weapons under high nuclear/chemical threat; (3) a set for employment of nuclear weapons; and, (4) a set for employment of chemical weapons. Within each set, concepts are ordered in terms of general doctrinal preference; this guides the order in which the concepts are considered by C^2I elements. Within the model, this organization is implemented by means of a directory of weapons employment concept as portrayed in Figure II-22. Each entry in the directory is a reference to a particular list of employment concepts corresponding to the concept sets noted above. Within each list, doctrinal preference is implemented by the accessing sequence of the list: the first employment concept on the list is the most preferred, the second is the next-most preferred, and so on.

Each INWARS C^2I element at echelons above division must be provided with access to a weapons employment concept directory through its UOS. Like concepts of operation, weapons employment concepts have been designed to be independent of echelon within the EAD C^2I elements. Thus, two named weapons employment directories must generally be created--one for each side.

To initiate the creation of named weapons employment directories, the line:

'EMPLOYMENT CONCEPT DIRECTORY'

must precede all directory specifications and employment concept inputs.

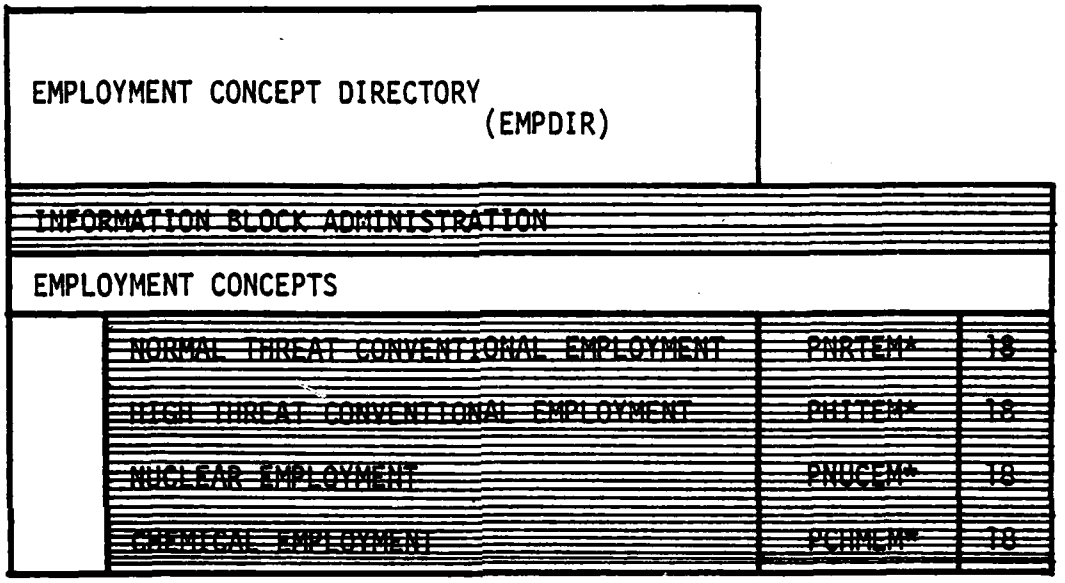


Figure II-22. Employment Concept Directory Structure

1. Create Named Weapons Employment Concept Directory

To initiate the creation of a specific named weapons employment concept directory, the line:

'DIRECTORY = ||NAME||'

must precede the list specifications and inputs for the specific employment concepts to be included in the directory. These concept blocks can be created in appropriate lists as discussed in the next section. As they are created, references to these lists are inserted into the named directory in accordance with the list type specification.

2. Create Weapons Employment Concepts

In the context of a specific named weapons employment concept directory, appropriate lists of employment concepts must be created for:

(1) employment of conventional weapons under normal nuclear/chemical threat;

(2) employment of conventional weapons under "high" nuclear/chemical threat;

(3) employment of nuclear weapons; and, (4) employment of chemical weapons.

To initiate creation of any of these lists, the line:

'<LIST TYPE KEYWORD>'

where:

<LIST TYPE KEYWORD> = CONVENTIONAL NORMAL/
CONVENTIONAL HIGH/
NUCLEAR/CHEMICAL

must precede the inputs for the specific employment concepts to be included. The list type keyword specifies where a reference to the forthcoming list is to be inserted into the Employment Concept Directory.

To create the list specified by the list type keyword, appropriate inputs are then made for each weapons employment concept to be included in the list. Weapons employment concepts have the structure portrayed in Figure II-23. The specific inputs will now be discussed.

EMPLOYMENT CONCEPT BLOCK (EMPBLK)		
INFORMATION BLOCK ADMINISTRATION		
SUITABILITY INFORMATION		
LOWEST APPLICABLE ECHELON	LOWECH	3
APPLICABLE JUSTIFICATIONS	ADJUST	12
APPRAISAL INFORMATION		
EXPECTED SUBORDINATE EMPLOYMENT PRIORITY	EXPSEP	3
MINIMUM APPROPRIATENESS	MINAPP	3
OVERALL EMPLOYMENT INFORMATION		
DISCRETIONARY CONTROL FRACTION	DCFRAC	7
NATIONAL TERRITORY CONSTRAINT INDICATOR	NTCONF	1
COLLATERAL DAMAGE CONSTRAINT INDICATOR	CDCONF	1
UTILIZATION INTERVAL	UTILTM	18
EMPLOYMENT INFORMATION FOR TARGET TYPE Ø		
BASIC TARGET PRIORITY	BASPRI	3
DESIRED EFFECT LEVEL	DESEFF	2
⋮		
EMPLOYMENT INFORMATION FOR TARGET TYPE 7		
BASIC TARGET PRIORITY	BASPRI	3
DESIRED EFFECT LEVEL	DESEFF	2

Figure II-23. Employment Concept Structure

a. Basic Employment Concept Information

This information element provides a reference to the name of the employment concept. The name itself is entered as a string of characters.

- Range: N/A
- Input Format: Character String

b. Suitability Information

These two information elements represent the conditions under which the employment concept will be judged suitable for application by the C^2I element.

1) Lowest Applicable Echelon

The lowest echelon of command which can develop weapons employments utilizing the concept. Used to restrict the applicability of employment concepts to certain higher echelon commands.

- Range: N/A
- Input Format: THEATER/
  ARMY GROUP/FRONT/
  CORPS/ARMY/
  DIVISION/
  BRIGADE/REGIMENT

2) Applicable Justifications

A string of flags representing the situations under which the employment concept may be utilized. The possible situations are: (1) Critical Forward Operation Progress, (2) Critical Forward Operation Failure, (3) Critical Kernel Operation Progress, (4) Critical Kernel Operation Failure, (5) Critical Strength, (6) Critical Unit Balance, (7) Critical Nuclear Threat, and, (8) Critical Chemical Threat. Any or all of these may be flagged as applicable justifications. Thus, applicable justifications may be used to restrict the utilization of particular employment concepts to certain specific sets of situations.

- Range: N/A
- Input Format: {<FWD PROGRESS/FORWARD FAIL/
  KERNEL PROGRESS/KERNEL FAIL/

STRENGTH/UNIT BALANCE/
NUCLEAR THREAT/CHEMICAL THREAT>,}

c. Appraisal Information

These two information elements concern the appraisal of an employment plan developed under the given employment concept.

1) Expected Subordinate Employment Priority

The expected priority of targets against which weapons apportioned to subordinates will be employed. Used in assessing the expected contribution of weapons apportioned to subordinates to the overall impact of an employment plan.

- Range: 0 - 7 (7 = highest priority)
- Input Format: Integer

2) Minimum Appropriateness

The minimum acceptable level of the appropriateness appraisal (expected priority of engaged targets and subordinate apportionment). Below this level, an employment plan will be considered inappropriate and will hence not be acted on.

- Range: 0 - 7 (7 = highest priority)
- Input Format: Integer

d. Overall Employment Information

These information elements represent guidance concerning certain features of developing a weapons employment as a whole under this employment concept.

1) Discretionary Control Fraction

A fraction to be applied to the total weapons available for employment in order to determine the portion of weapons which may be assigned directly against target under the discretionary control of the C^2I element developing the employment. Remaining weapons will be apportioned among subordinates for their use. This fraction is used to reflect the degree to which the implementation of an employment is decentralized.

- Range: 0.00 - 1.00
- Input Format: Real

2) National Territory Constraint Indicator

A flag which indicates whether or not national territory constraints are to be considered in developing an employment under this concept.

- Range: 0,1 (1 = national territory constraints to be considered)
- Input Format: Integer

3) Collateral Damage Constraint Indicator

A flag which indicates whether or not collateral damage constraints are to be considered in developing an employment under this concept.

- Range: 0,1 (1 = collateral damage constraints are to be considered)
- Input Format: Integer

4) Utilization Interval

The time interval within which weapons employed in accordance with this concept are to be utilized. Used to set the utilization interval for any weapons employment packages formulated in acting on an employment developed under this concept.

- Range: 0 - 4000 hours
- Input Format: Integer

e. Target-Related Employment Information

These information elements represent employment guidance which is related to--and varies among--the different target types. Within the employment concept, these two information elements are thus repeated once for each target (see Figure II-23). Included here are information elements which prescribe the basic priority and effects to be inflicted upon the various target types.

1) Basic Target Priority

An ordinal indication of the basic importance of the given target type relative to other target types. It may be modified in developing an employment based on the echelon of the target (relative to the echelon of the developing C^2I element).

- Range: 0 - 7 (7 = highest priority;
  0 = unsuitable for targeting under this concept)
- Input Format: Integer

2) Desired Effect Level

An indication of the desired effect level to be inflicted upon the given target type if engaged under this concept. It may be modified in developing an employment based on operative weapons assignment constraint.

- Range: N/A
- Input Format: DEGRADE/DISRUPT/DESTROY

E. CREATE NAMED WEAPONS PARAMETERS COMPONENTS

In addition to the weapons employment concepts discussed in the previous section, certain parameters associated with specific weapons types are needed in the development of a weapons employment plan. These parameters concern requirements and constraints as well as expected effects of employing the corresponding types of weapons.

Each weapons parameter structure contains all parameters associated with a given type of weapons. Thus, three weapons parameter structures are required, one each for conventional (interdiction), nuclear, and chemical weapons. To facilitate accessing, references to these three parameter structures are consolidated in a single structure--the weapons parameters directory. Each side would typically have its own weapons parameters directory. However, there would generally be no reason to distinguish the parameters of weapons available to different echelons within a side. Thus, two weapons parameter directories would typically provide a sufficient characterization of weapons.

To initiate the creation of named weapons parameter components, the line:

'WEAPONS PARAMETER DIRECTORY'

must precede all directory specifications and weapons parameter inputs.

1. Create Named Weapons Directory

To initiate the creation of a specific named weapons parameter directory, the line:

'DIRECTORY = ||NAME|| '

must precede the inputs for the parameter structures to be included in the directory. These parameter structures can then be created as discussed in the next subsection. As they are created, references to the parameter blocks are inserted into the weapons parameter directory whose structure is portrayed in Figure II-24.

2. Create Weapons Parameter Structure

In the context of a specific named weapons parameter directory, one weapons parameter structure must be created for each type of weapons--conventional (interdiction), nuclear, and chemical. The parameters characterizing each type of weapons must be preceded by the line:

'WEAPONS TYPE = <INTERDICTION/NUCLEAR/CHEMICAL>'

Following this, parameter inputs for the weapons type indicated may be specified. The weapons parameter structure consists of a basic block of parameters relating only to the weapons themselves together with a list of blocks containing parameters concerning the relationship of the given type of weapons to the various types of targets. Inputs to the basic weapons parameters block are discussed in Section a, below; weapons-target inputs are then discussed in Section b.

a. Basic Weapon Parameters

Parameters characterizing the given type of weapons themselves are contained in a weapons parameters block having the form presented in Figure II-25. As can be seen, it includes basic parameters and national-territory-dependent parameters. These will now be discussed.

1) Minimum Weapons Assignment

This parameter characterizes the smallest quantity of weapons of the given type which can be effectively assigned against a single target.

- Range: 0 - 262,000 appropriate units (sorties, kilotons, tons)
- Input Format: Integer

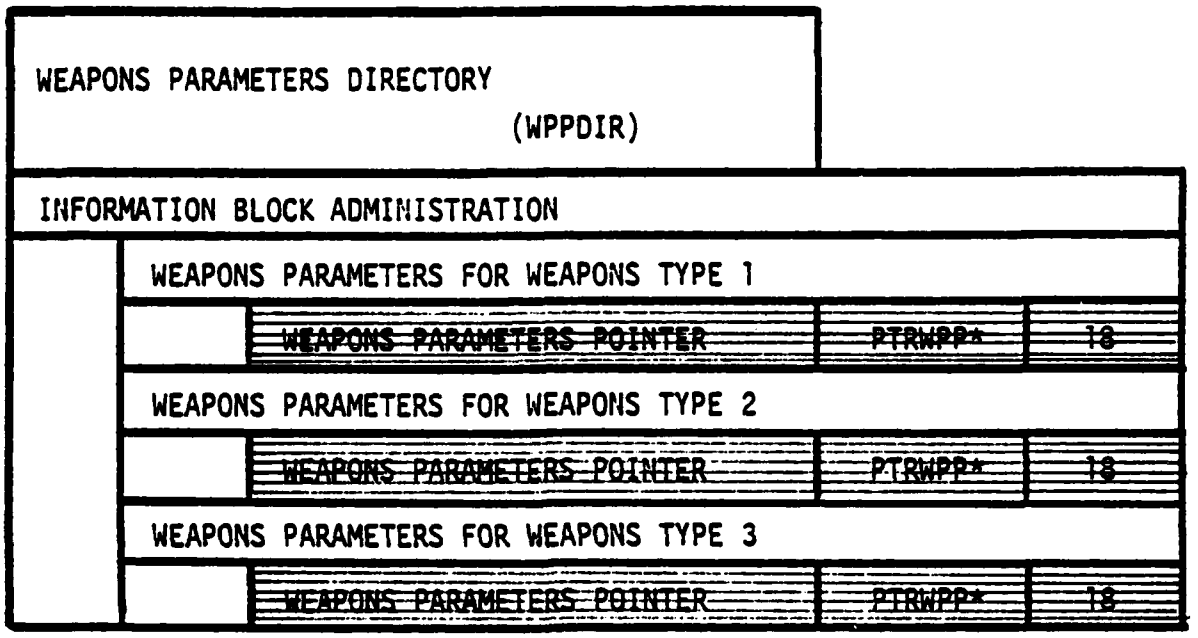


Figure II-24. Weapons Parameters Directory Structure

WEAPONS PARAMETERS BLOCK (WPPBLK)			
~~INFORMATION BLOCK ADMINISTRATION~~			
BASIC PARAMETERS			
	WEAPONS TYPE	WPNTYP	3
	MINIMUM WEAPONS ASSIGNMENT	MINWPN	18
	GROSS STRENGTH REDUCTION FACTOR	GSTRED	18
	GROSS EFFECTIVE COVERAGE FACTOR	GEFCOV	18
	IN-DAY RESERVATION FACTOR	INDARS	7
TARGET DEPENDENT PARAMETERS			
	~~POINTER TO TARGET PARAMETERS BLOCK~~	~~PTRTPP*~~	~~18~~
PARAMETERS FOR NATIONAL TERRITORY Ø			
	MAX WEAPONS ASSIGNMENT	TERØØ	18
⋮			
PARAMETERS FOR NATIONAL TERRITORY 15			
	MAX WEAPONS ASSIGNMENT	TER15	18

Figure II-25. Weapons Parameters Block Structure

2) Gross Strength Reduction Factor

The expected reduction in gross enemy strength resulting from a "typical" employment of one unit of weapons of the given type (sortie, kiloton, ton). Used for gross effects estimation in conjunction with consideration of enemy response constraints.

- Range: 0 - 262,000 strength units
- Input Format: Integer

3) Gross Effective Coverage Factor

The expected square kilometers "covered"--in the sense of producing collateral damage--as a result of a typical employment of one unit of weapons of the given type (sortie, kiloton, ton). Used for estimation of collateral damage in conjunction with consideration of collateral damage constraints.

- Range: 0 - 262,000 km^2
- Input Format: Integer

4) In-Day Reservation Factor

A factor reflecting the importance of utilizing weapons of the given type "evenly" over a day. A value of 0.00 indicates that any weapons may be used at any time in the day; by contrast, a value of 1.00 indicates that weapons may only be used in proportion to the time elapsed in the day. This factor is used only for weapons allocated on a daily rate basis (e.g., interdiction sorties/day).

- Range: 0.00 - 1.00
- Input Format: Real

5) National Territory-Dependent Parameters

These information elements represent constraints on the weapon type which are related to--and vary among--different national territories. In particular, the constraint takes the form of the maximum amount of weapons which may be assigned against a single target located in a particular national territory. One such constraint is included for each national territory.

- Range: 0 - 262,000 appropriate units (sorties, kilotons, tons)
- Input Format: Integer

b. Weapons Target Parameters

In addition to specific parameters, the Weapons Parameters block contains a pointer reference to a list of blocks containing parameters characterizing relationships between the given type of weapons and the various target types. Each of these Target Parameters Blocks has the structure presented in Figure II-26 and concerns a specific type of target. Within the context established by the 'WEAPONS TYPE = <INTERDICTION/NUCLEAR/CHEMICAL>' line, one Target Parameters Block must be input for each target type. The input for the i^{th} target type must be preceded by the line:

TGTTYP = i

The particular target parameters to be imput will now be discussed.

1) Largest Targetable Echelon

The largest echelon of the given target type which can be effectively targeted with weapons of the given type.

- Range: 0 - 6 (6 = Theater)
- Input Format: Integer

2) Information Timeliness Criterion

The maximum age of the target information which still qualifies the force element as an acquired target for the purposes of engagement with the given type of weapons.

- Range: 0 - 4000 hours
- Input Format: Integer

3) Minimum Hex Level Precision Criterion

The maximum hex level in which a target of the given type can be located and still qualify as an acquired target for the purposes of engagement with the given type of weapons.

- Range: 0-6
  (Level 0: 9.45 km hexes; Level 1: 25 km;
  Level 2: 66 km; Level 3: 137 km; Level 4: 362 km;
  Level 5: 959 km; Level 6: 2537 km)
- Input Format: Integer

TARGET PARAMETERS BLOCK (TPPBLK)		
~~INFORMATION BLOCK ADMINISTRATION~~		
BASIC WEAPON-TARGET PARAMETERS		
TARGET TYPE	TGTTYP	3
LARGEST TARGETABLE ECHELON	LTGECH	3
INFORMATION TIMELINESS CRITERION	INFOCR	18
MIN HEX LEVEL PRECISION CRITERION	LOCPCR	4
MIN FRACTION ACQUIRED CRITERION	FRACCR	7
WEAPON-TARGET EFFECT LEVEL PARAMETERS		
BASIC WEAPONS ASSGN FOR LEVEL 1	BASSG1	18
BASIC WEAPONS ASSGN FOR LEVEL 2	BASSG2	18
BASIC WEAPONS ASSGN FOR LEVEL 3	BASSG3	18
STRUCTURE INFORMATION		
~~POINTER TO NEXT TARGET PARAMETERS~~	~~PNXTPP*~~	~~18~~

Figure II-26. Target Parameters Block Structure

4) Minimum Fraction Acquired Criterion

The minimum fraction of an aggregate force element which must be "acquired" to qualify the aggregate force element as an acquired target for the purposes of engagement with the given type of weapons.

- Range: 0.00 - 1.00
- Input Format: Real

5) Basic Weapons Assignments

The quantity of weapons of the given type which must be assigned against a target of the given type to achieve a desired level of effect. A separate basic weapons assignment is included in the parameter block for each of the three possible desired effect levels.

- Range: 0 - 262,000 appropriate units (sorties, kilotons, tons)
- Input Format: Integer

CHAPTER III
EAD C^2I ELEMENT UNDERSTANDING OF THE SITUATION (UOS) INPUTS

As was noted in the introduction, inputs to the C^2I processes consist primarily of UOS Information structures and elements. In particular, the UOS of each EAD C^2I element must be created and filled with certain information, consisting principally of Fundamental Knowledge components which guide the EAD C^2I element in its activities, but also including information needed to "initialize" that UOS.

Since Fundamental Knowledge information does not change in the course of a simulation run, it is possible for groups of C^2I elements to share various components. As was noted in Chapter II, above, the design of the C^2I processes has emphasized this possibility in order to decrease storage requirements and, derivatively, to facilitate C^2I input preparation. By means of the procedures described in Chapter II, it is possible for the user to create (input) various Fundamental Knowledge information structures as named components. The virtue of this approach is that the user may then refer to these components by name in creating the UOS's of the individual C^2I elements. The procedures by which this is done are described in this chapter.

A. CREATING UOS's

For each C^2I element at Echelons Above Division (EAD) a unique Understanding of the Situation (UOS) must be created. To initiate this process, the individual UOS specifications and input must be preceded by the line:

'UOS'

This initiates the proper procedures to receive UOS specifications and inputs.

To create the UOS for a specific EAD C^2I element, the appropriate information structures must not only be created, but must also be linked to the C^2I element. This linkage is established by a reference residing in

the C^2I element's physical "scoreboard". This is accomplished by the line:

'<AIR/GROUND> UNIT = || UNITID || '

where || UNITID || is the six-digit identity of the particular C^2I element whose UOS is about to be created and 'AIR' or 'GROUND' is specified appropriately for that unit. The reference inserted into that C^2I element's scoreboard is to a UOS header block having the structure portrayed in Figure III-1. Note that none of the information elements included in the UOS header are directly input. The "Unit Identity" element is filled in based on the UNITID specified for the C^2I element.

The '<AIR/GROUND> UNIT = || UNITID || ' line establishes a context within which UOS specifications and inputs are made. All such specifications and inputs are linked appropriately into the particular UOS header block created by that line.

All other information elements in the UOS header are access references (i.e., pointers) to various UOS information components. Certain of these references are set based on the UOS specifications to be made as described in the following sections. Others are established during initialization. It should be noted that the UOS header block is the "root" of the overall UOS structure in the sense that all information in a particular UOS is accessible--perhaps via a chain of references--from the header block of that UOS.

B. ATTACHING NAMED FUNDAMENTAL KNOWLEDGE COMPONENTS TO A SPECIFIC UOS

Within the context established by the '<AIR/GROUND> UNIT = || UNITID || ' line, named Fundamental Knowledge components created as described in Chapter II, above, may be "attached" to the specific UOS by a sequence of simple specification statements. These statements have the form:

'SET <UOS KEYWORD> = || NAME || '

where "<UOS KEYWORD>" specifies the type of component being attached and "|| NAME || " refers to a named component of the appropriate type. The components which may be attached are, of course: (1) Standard Operating

AD-A124 336 INTEGRATED NUCLEAR AND CONVENTIONAL THEATER WARFARE SIMULATION (INWARS) D..(U) BDM CORP MCLEAN VA J R ALDRICH ET AL. 08 FEB 80 BDM/W-80-047-TR-PT-4-3 2/2

UNCLASSIFIED DAAG39-77-C-0174 F/G 15/7 NL

END

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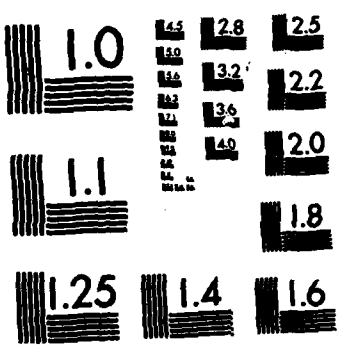
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

UNDERSTANDING OF THE SITUATION (UOS)		
INFORMATION BLOCK ADMINISTRATION		
FUNDAMENTAL KNOWLEDGE		
UNIT IDENTITY	UNITID	18
STANDARD OPERATING PROCEDURES	PTRSOP*	18
UPDATING THRESHOLDS & FLAGS DIRECTORY	PTRUTF*	18
CONCEPT OF OPERATION DIRECTORY	PTRCON*	18
EMPLOYMENT CONCEPT DIRECTORY	PTREMP*	18
WEAPONS PARAMETERS DIRECTORY	PTRWPP*	18
FORCE ELEMENT DIRECTORY	PTRFED*	18
SITUATION INFORMATION		
OWN STATUS INFORMATION	PTROS*	18
ENEMY ORDER OF BATTLE/TARGET INFORMATION	PTEOBT*	18
SITUATION FEATURES INFORMATION	PTRSF*	18
OPERATIONS INFORMATION		
OPERATIVE OPERATION DIRECTIVE	PTRDIR*	18
OPERATING CONCEPT OF OPERATION	PTROPN*	18
PROGRESS MANAGEMENT BLOCK	PTRPRG*	18
WEAPONS MANAGEMENT BLOCK	PTRWMG*	18
READINESS MANAGEMENT BLOCK	PTRRMG*	18

Figure III-1. UOS Header Block Structure

Procedures, (2) Updating Thresholds and Flags Directories; (3) Concept of Operation Directories; (4) Employment Concept Directories; and, (5) Weapons Parameter Directories.

1. Attaching Named SOP Components

To attach a named SOP component to a particular UOS, the specification statement line is:

'SET SOP = ||NAME|| '

The effect of this statement is to insert a reference to the named SOP block into the "Standard Operating Procedures" information element of the UOS. The SOP component includes an SOP block as well as the lists of readiness blocks attached to it (See Chapter II, Section A, for details on these components.)

2. Attaching Named Updating Thresholds and Flags (UTF) Components

To attach a named UTF component to a particular UOS, the specification statement line is:

'SET UTF DIRECTORY = || NAME || '.

The effect of this statement is to insert a reference to the directory of the named UTF component into the "Updating Thresholds and Flags Directory" information element of the UOS. The UTF component includes the directory block itself together with the various UTF blocks attached to it. (See Chapter II, Section B, for details on these components.)

3. Attaching Named Concepts of Operation Components

To attach a named Concept of Operation component to a particular UOS, the specification statement line is:

'SET CONCEPTS OF OPERATION = || NAME || '

The effect of this statement is to insert a reference to the directory of the named Concepts of Operation component into the "Concept of Operation Directory" information element of the UOS. The Concepts of Operation component includes the concept directory block together with the lists of concepts of operation attached to it. (See Chapter II, Section C, for details on these components).

4. Attaching Named Employment Concepts Components

To attach a named Employment Concept component to a particular UOS, the specification statement line is:

'SET EMPLOYMENT CONCEPTS = || NAME|| '.

The effect of this statement is to insert a reference to the directory of the named Employment Concepts component into the "Employment Concept Directory" information element of the UOS. The employment concepts component includes the concept directory block as well as the lists of employment concepts attached to it. (See Chapter II, Section D, for details on these components.)

5. Attaching Named Weapons Parameter Components

To attach a named Weapons Parameters component to a particular UOS, the specification statement line is:

'SET WEAPONS PARAMETERS = || NAME|| '

The effect of this statement is to insert a reference to the directory of the named Weapons Parameters component into the "Weapons Parameters Directory" information element of the UOS. The Weapons Parameters component includes the weapons parameters directory block as well as the three weapons parameter structures attached to it. (See Chapter II, Section E, for details on these components.)

C. PREPARING A SPECIFIC UOS FOR INITIALIZATION

Fundamental Knowledge inputs are the major components input to an EAD C^2I element's UOS. However, referring back to the UOS structure portrayed in Figure I-1, above, it is apparent that there are many other components including Situation Data, Operations Data and Situation Representation information. These other components are prepared by the simulation itself during initialization. For example, Situation Data and Situation Representation information are prepared by an initial perception and information collection cycle during which force elements have a chance to "observe" the force structures input by the user. Moreover, Operations Data is prepared during the initial planning by which EAD C^2I elements determine how to accomplish the objectives specified in the user-input theater operations

directives. This initial planning starts with the theater C^2I elements themselves and proceeds on down through the chain-of-command to Army Groups/Fronts and Corps/Armies. Certain additional operational information needed in these initialization processes must be supplied by the user during the creation of specific UOS's.

Within the context established by the '<AIR/GROUND> UNIT = ||UNITID||' line, these additional operational information elements may be input as described in the following sections. This input processing must be preceded by the line:

'OPERATION STRUCTURE'

The effect of tis line is to initiate apprpriate procedures to accept initial operational inputs concerning force deployment and support relationships.

1. Initial Force Deployment Input

Initial force deployment inputs specify how the large-scale forces controlled by EAD C^2I elements are to be configured at the start of the simulation. This information must specify the axis of operations and sector width of the overall force, the particular subordinate force elements which are "forward" (i.e., available to fill forward roles in the initial operation), and particular reserve associations among subordinate force elements, if any.

a. Axis of Operations and Sector Width

Axis of operations and sector width inputs characterize the EAD C^2I element's area of operations at the start of the simulation. They may be changed by the EAD C^2I element itself in developing operations to respond to its initial operation directives; however, they are needed by certain initialization procedures which are performed prior to the initial operations development activities.

1) Axis of Operations

The axis of operations of an EAD C^2I element specifies the direction in which his subordinates would initially advance. It is specified in terms of degrees.

- Range: 0 - 360°
- Input Format: Integer

2) Sector Width

The sector width of an EAD C^2I element specifies the width of his initial area of operations along the previously specified axis of operations.

- Range: 0 -64 X10 Kilometers (i.e., 0 -640 kilometers in 10 kilometer increments)
- Input Format: Integer

b. Forward Force Specification Inputs

Among an EAD C^2I element's principal subordinates, some or all may be deployed in such a way as to be able to assume forward (or "contact") roles in an operation. Since this may vary from scenario to scenario, it has been left under the explicit input control of the user. To make these inputs, the user simply lists the unit identities of all subordinates to the C^2I element which it is to regard as "forward forces". More specifically, the following input statement is used:

FORWARD FORCES = { ‖ UNITID ‖ ,}

In processing this statement, the initialization Role Block for each UNITID listed is located and "marked" as a forward role; if an initialization Role Block cannot be found, an error condition is reported.

The order in which the subordinate forward force UNITID's are listed must reflect a left-to-right orientation from the viewpoint of the EAD C^2I element. As the list of UNITID's is processed, the first UNITID will be established as the "left-most" forward role, the second UNITID will be established immediately to the right of the "left-most" forward role, and so on, down to the last UNITID which will be established as the "right-most" forward role. "Left" and "right" reflect the point of view of the EAD C^2I element as it faces the opposing forces. Thus, for an EAD C^2I element facing due East, the "northern-most" forward subordinate would be the "left-most" (and hence would be input first); the "southern-most" forward subordinate would be the "right-most" (and hence input last). By contrast, for an EAD C^2I element facing due West, the left-to-right

orientation would be exactly reversed (i.e., the "norther-most" would be the "right-most").

c. Reserve Relationship Inputs

The last initial deployment inputs enable the user to specify that a particular (non-forward) force element is to serve initially as a dedicated reserve to a forward force element. These inputs are optional--the user need not specify any initial reserve associations. If he does, statemens of the following form must be used:

|| RESERVE UNITID || IS RESERVE TO ||SUPPORTED UNITID|| .

As many statements of this form may be used as required to establish the desired relationships. Each statement is processed by locating the initialization Role Blocks for the units indicated and linking them by means of Reserve Associate Pointers. If one of the units cannot be found on are not deployed appropriately (i.e., reserve unit in non-forward role, supported unit in forward role), an error condition is reported.

2. Support Relationships Input

Besides the subordinate forces it controls, an EAD C^2I element may be able to call on several other force elements for support--air force EAD C^2I elements, its own combat source support complex, and nuclear or chemical delivery agencies. Like the chain-of-command structure, these support relationships are left under the explicit control of the user via inputs. Within the model, such relationships are represented by Force Element Directory Entry Blocks as shown in Figure III-2. These blocks are input by the user and placed on a list of support forces accessible through the Force Directory component of the EAD C^2I element's UOS. (See the Software Description, Volume II, Chapter II, Section F for further details.)

Within the context established by the '<AIR/GROUND> UNIT = UNITID ' and 'OPERATION STRUCTURE' lines, the creation of an individual support relationship is initiated by the line:

'SUPPORT'

This line initiates procedures to receive inputs to a supporting Force Element Directory Entry Block as will now be described.

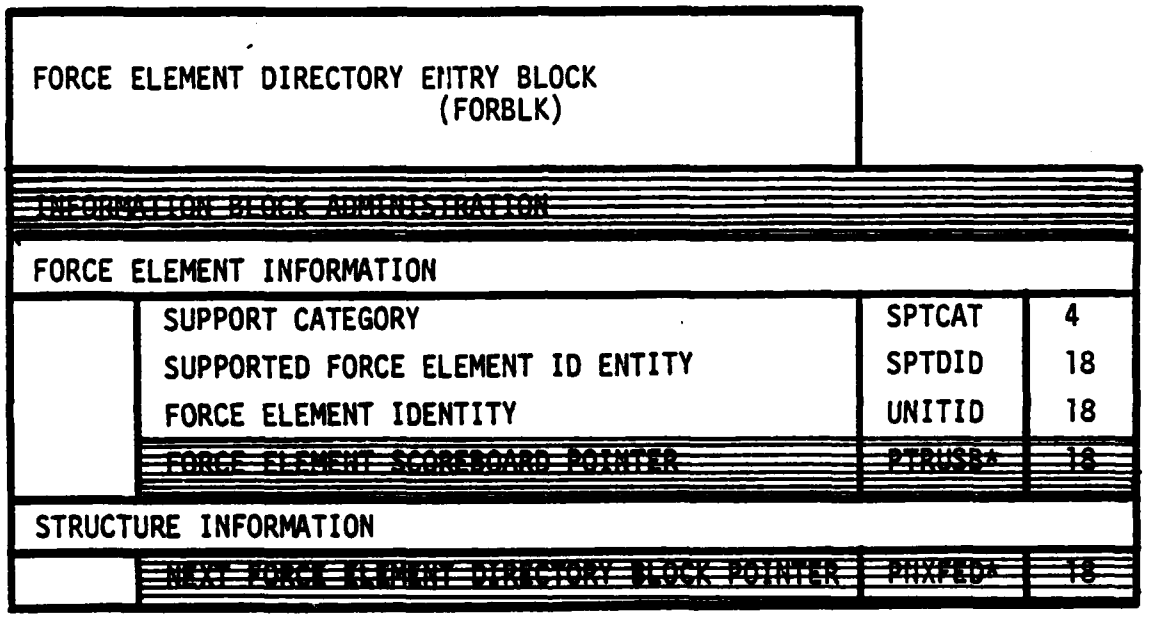


Figure III-2. Force Element Directory Entry Structure

a. Support Category

A code indicating the particular type of support provided to the C^2I element. At present, this may be: (1) air support, (2) nuclear weapons delivery support, (3) chemical weapons delivery support, or, (4) service support.

- Range: N/A
- Input Format: AIR-SPT/NUC-WPNS-SPT/ CHM-WPNS-SPT/SVC-SPT

b. Supported Force Element Identity

The unit identity of the particular force element supported by the force element characterized by the directory entry block.

- Range: N/A
- Input Format: 6-digit Unit Identity

c. Force Element Identity

The unit identity of the force element characterized by the directory entry block.

- Range: N/A
- Input Format: 6-digit Unit Identity

D. OPTIONAL UOS SPECIFICATIONS

Still operating within the context specified by the line '<AIR/GROUND> UNIT = ||UNITID|| ', the user may optionally specify two other UOS components by inputs: the Weapons Management component and/or the Readiness Management Component. Weapons Management inputs may be utilized to authorize specific packages of nuclear or chemical weapons to the EAD C^2I element whose UOS is being specified. Readiness management inputs may be used to put the EAD C^2I element in a higher readiness state than state "Ø", the default state.

1. Optional Weapons Management Input

The Weapons Management component of the UOS was discussed in the Software Description, Volume II, Chapter II, Section N. From an input

point of view, the only elements of interest to the user would be the packages of authorized nuclear or chemical weapons. To input either or both types of packages, the user must first use the statement

'WEAPONS MANAGEMENT'

This creates a Weapons Management Block having the form shown in Figure III-3. As can be seen, there are no direct inputs to this block; however, the "oldest Nuclear Employment Package" and "oldest Chemical Employment Package" pointers provide points of "attachment" for user-specified weapons packages.

To input a particular nuclear/chemical weapons package, the user must then use the statement

'<NUCLEAR/CHEMICAL> PACKAGE'.

This initiates procedures to receive the given type of package inputs and also specifies which of the package pointers in the Weapons Managment Block should be used to reference the input package. The package inputs themselves are used to build an Employment Package Block having the form presented in Figure III-4. Its input will now be discussed.

a. Employer Information

The unit identity of the EAD C^2I element which is authorized to employ the weapons specified in the package.

- Range: N/A
- Input Format: 6-digit Unit Identity

b. Weapons Information

These two information elements specify the type and quantity of weapons authorized for employment. Weapons type is implicit in the package designator format described above. Weapons quantity represents the maximum amount of weapons authorized for employment. It range and format are as follows:

- Range: 0 - 262,000 appropriate units (sorties, kilotons, or tons)
- Input Format: Integer

c. Employment Information

These two information elements specify the conditions under which the specified weapons are authorized for employment.

WEAPONS MANAGEMENT BLOCK (WMGBLK)		
~~INFORMATION BLOCK ADMINISTRATION~~		
CONVENTIONAL WEAPONS TARGETING INFORMATION		
~~OPERATIVE TARGETING CONCEPT~~	~~POPTGT*~~	~~18~~
NUCLEAR WEAPONS MANAGEMENT INFORMATION		
TIME OF LAST NUCLEAR REQUEST	LNURTM	18
~~OLDEST NUCLEAR EMPLOYMENT PACKAGE~~	~~POLDNU*~~	~~18~~
CHEMICAL WEAPONS MANAGEMENT INFORMATION		
TIME OF LAST CHEMICAL REQUEST	LCHRTM	18
~~OLDEST CHEMICAL EMPLOYMENT PACKAGE~~	~~POLDCH*~~	~~18~~

Figure III-3. Weapons Management Block Structure

EMPLOYMENT PACKAGE BLOCK (PKGBLK)			
INFORMATION BLOCK ADMINISTRATION			
EMPLOYER INFORMATION			
	EMPLOYER	UNITID	18
WEAPONS INFORMATION			
	WEAPONS TYPE WEAPONS QUANTITY	WPNTYP WPNQUN	3 18
EMPLOYMENT INFORMATION			
	JUSTIFICATION UTILIZATION INTERVAL EXPIRATION TIME	JUSTIF { UTILTM } { EXPRTM }	12 18 18
STRUCTURE INFORMATION			
	NEXT EMPLOYMENT PACKAGE POINTER	PNXPKG*	18

Figure III-4. Employment Package Block Structure

1) Justification

The justification of an employment package delimits the situations under which the specified weapons may be employed. Possible situations are: (1) Critical Forward Operation Progress, (2) Critical Forward Operation Failure, (3) Critical Kernel Operation Progress, (4) Critical Kernel Operation Failure, (5) Critical Strength, (6) Critical Unit Balance, (7) Critical Nuclear Threat, and (8) Critical Chemical Threat. Any or all of these may be flagged as acceptable conditions for employment.

- Range: N/A
- Input Format: {<FWD PROGRESS/FORWARD FAIL/
  KERNEL PROGRESS/KERNEL FAIL/
  STRENGTH/UNIT BALANCE/
  NUCLEAR THREAT/CHEMICAL THREAT>,}

2) Utilization Interval

The time interval within which the weapons specified in the package are authorized for employment. It is measured from the time at which the simulation starts (i.e., minutes).

- Range: 0 - 4000 hours
- Input Format: Integer

2. Optional Readiness Management Inputs

The Readiness Management component of an EAD C^2I element's UOS was discussed in the Software Description, Volume II, Chapter II, Section 0. From an input perspective, the user may wish to specify an initial directed nuclear or chemical readiness state higher than state Ø (which is the default state if no inputs are made). To initiate such inputs, the line:

'READINESS MANAGEMENT'

must be used. This creates a Readiness Management Block having the form presented in Figure III-5. As can be seen, the inputs to this block are the Directed Nuclear Readiness State (DNUKST) and the Directed Chemical Readiness State (DCHMST). These are input by the lines:

'NUCLEAR READINESS = i'
'CHEMICAL READINESS = j'

READINESS MANAGEMENT BLOCK (RMGBLK)		
~~INFORMATION BLOCK ADMINISTRATION~~		
NUCLEAR READINESS MANAGEMENT INFORMATION		
DIRECTED NUCLEAR READINESS STATE	DNUKST	3
~~OPERATIVE NUCLEAR READINESS BLOCK POINTER~~	~~PNUCRD*~~	~~18~~
CHEMICAL READINESS MANAGEMENT INFORMATION		
DIRECTED CHEMICAL READINESS STATE	DCHMST	3
~~OPERATIVE CHEMICAL READINESS BLOCK POINTER~~	~~PCHMRD*~~	~~18~~

Figure III-5. Readiness Management Block Structure

The specific values input should correspond to the particular Readiness Block by which the user desires the EAD C^2I element to operate initially. (See Chapter II, Section A.1, above, for discussion of Readiness Block inputs.)

CHAPTER IV
DIRECTIVE INPUTS

Although the basic C^2I inputs involve UOS elements, certain other types of inputs with impacts on C^2I processes are possible. In particular, it is possible for the user to "send" various types of directives to EAD C^2I elements. These inputs allow the user to influence C^2I behavior "externally". Operations directives, readiness directives, and weapons employment directives may be input as described below.

In preparing directive inputs, the user should adopt the perspective of an echelon of command superior to the theater level C^2I elements (i.e., "Natural Command Authorities"). In general, such input directives should also be sent to (or "through") the theater level C^2I elements. This allows the C^2I processes to properly accomodate the new directive. It would, for example, be possible to send a new operations directive directly to a corps level C^2I element. However, the parent Army Group C^2I element would not be aware of this imposed change in its subordinate's operation. It would accordingly continue its own overall operation under the mistaken assumption that the subordinate corps was still behaving as directed. It is difficult to predict the possible outcomes of such a situation.

A. CREATING A MESSAGE TO CARRY THE DIRECTIVE INFORMATION

The first step in inputing a specific directive is to create a message block to "carry" the directive information. A message block has the structure portrayed in Figure IV-1. To initiate the message creation process, the line:

'CREATE MESSAGE'

must precede all specific message block inputs. These information inputs will now be discussed.

1. Sender Information

Sender information identifies the sender of the message. In consonance with the introductory comments to this chapter, user input

MESSAGE BLOCK (MESSAG)			
SENDER INFORMATION			
	SENDER IDENTITY	UNITID	18
MESSAGE CHARACTERISTICS			
	MESSAGE SECURITY	MSECUR	2
	MESSAGE PRIORITY	PRIOR	4
	MESSAGE CLASS	MSGCLS	4
	MESSAGE CONTENT	MSGCON	3
	MESSAGE FORM	MSGFRM	1
	MESSAGE KIND	MSGKND	4
	MESSAGE TIME	MDAYTM	18
MESSAGE INFORMATION			
	ASSOCIATED UNIT BLOCK POINTER	PASUNI*	18
	ASSOCIATED SITUATION FEATURE BLOCK POINTER	PASFEA*	18
	ASSOCIATED DIRECTIVE POINTER	PASDIR*	18
	ASSOCIATED REQUEST POINTER	PASREQ*	18

Figure IV-1. Message Block Structure

directives should be regarded as sent by a command element superior to the theater. Hence, "Sender Identity" need not be input for user input directives.

2. Message Characteristics

These information elements represent characteristics of the message.

a. Message Security

The level of security with which the directive is to be transmitted

- Range: 0 - 3 (3 = highest level)
- Input Format: Integer

b. Message Priority

The priority with which the directive is to be transmitted

- Range: 0 - 7 (7 = highest priority)
- Input Format: Integer

c. Message Class, Content, Form and Kind

Integer codes representing aspects of the information carried by the message. For user input directives, message content (MSGCON) should be entered as 1 (=directive content type code). Class, form and kind need not be input.

d. Message Time

The time at which the message is to be sent, input in hours after the "starting" time of the run.

- Range: 0 - 4000 hours
- Input Format: Integer

B. CREATING DIRECTIVE CONTENTS

The message block provides the vehicle to carry the directive information or content. The content itself is contained in a directive header block with the structure portrayed in Figure IV-2. (See the Software Description, Volume II, Chapter III, Section B, for further discussion of directives.) Three different types of content are possible corresponding

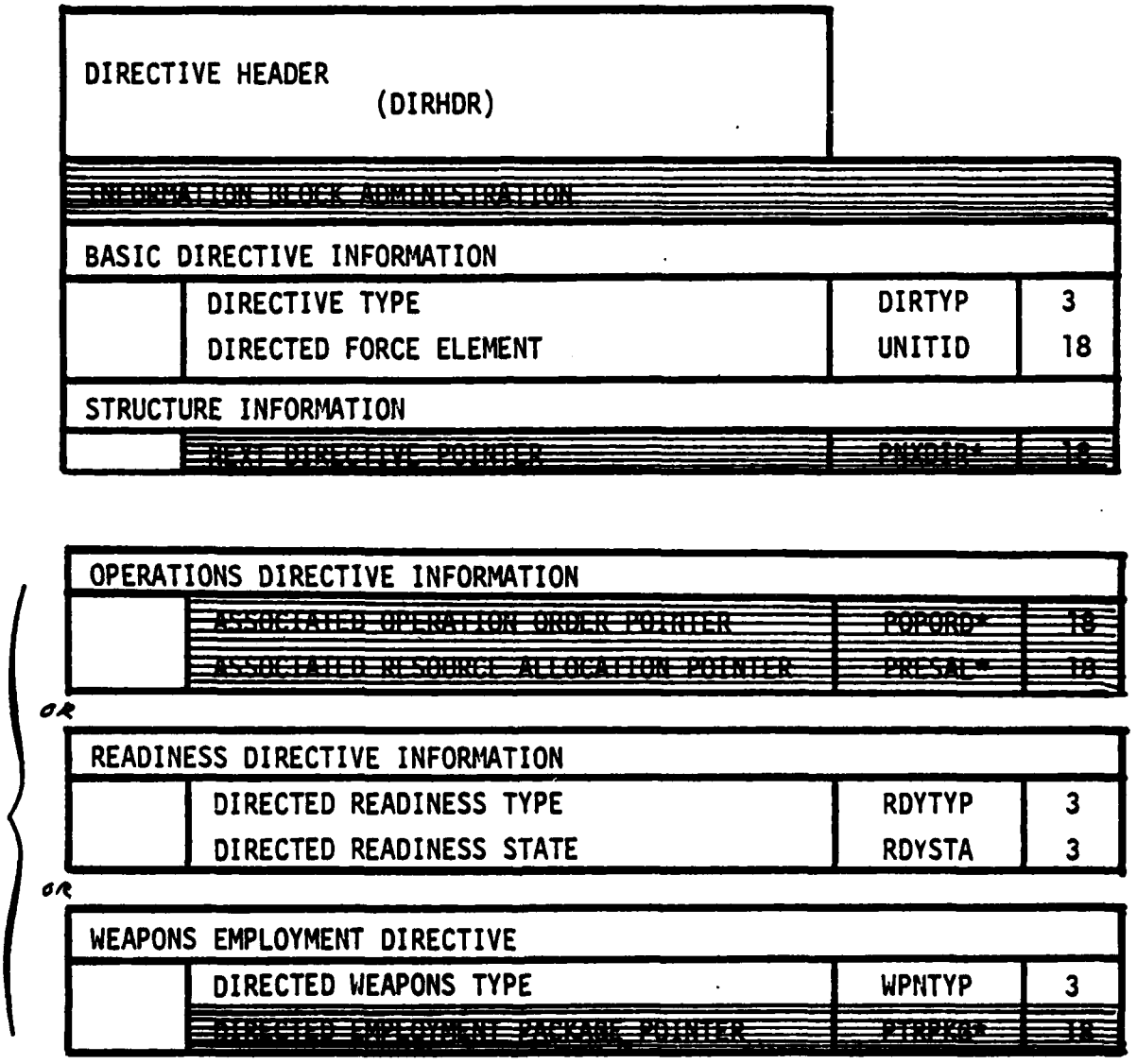


Figure IV-2. Directive Header Structure

to the type of directive being input (operations, readiness, or weapons employment). The line:

'DIRECTIVE CONTENT'

initiates the creation of a specific directive content. Since all directive contents contain the identity of the directed force element, this may now be input (in 6-digit Unit Identity format) by the line:

'FORCE ELEMENT = UNIT IDENTITY '.

All directive contents also contain an integer code representing the type directive. This is input next by means of the appropriate line:

'OPERATION DIRECTIVE', or
'READINESS DIRECTIVE', or
'WEAPONS DIRECTIVE'.

Besides implicitly setting the directive type in the directive header, this line invokes the proper routine to receive the type-dependent inputs. These will be discussed individually in Sections 1 - 3, below.

1. Creating Operation Directive Contents

An operation directive contains two basic components: (1) an operation order block having the structure presented in Figure IV-3, and, (2) a resource allocation block having the structure presented in Figure IV-4. These two blocks are created separately and are implicitly linked into the directive header structure.

a. Creating Operation Orders

The creation of a specific operation order as a directive component is initiated by the line:

'OPERATION ORDER'

The operation order block has been designed to be usable by all INWARS entities. As a consequence, certain of its information elements are not required by EAD C^2I elements; this accounts for the hatched information elements in Figure IV-3. The remaining direct-input information elements will now be discussed.

1) Operation Information

These information elements characterize the directed operation in terms of mission and objective. (Role specifications are not required by EAD C^2I elements.)

OPERATION ORDER BLOCK (OPORD)			
OPERATION			
	MISSION	MISCOD	5
	ROLE	ROLCID	6
	OBJECTIVE	HEXOBJ	21
DISPOSITION CONTROL			
	AXIS OF OPERATIONS	AXIS	9
	SECTOR WIDTH	SECTOR	6
OPERATION CONTROL			
	COMPLETION TIME	TIME	9
EXECUTION CONTROL			
	PLAN FLAG	FLGPLN	1
	NUMBER OF ATTACHED CONTINGENCIES	NCONTS	4
OPORD BLOCK ADMINISTRATION			
	LAST FLAG	FLGLST	1

Figure IV-3. Operation Order Block

RESOURCE ALLOCATION BLOCK (ALLBLK)		
INFORMATION BLOCK ADMINISTRATION		
AIR SUPPORT ALLOCATION		
ALLOCATED CAS RATE	(ALLCAS)	12
CAS ALLOCATION SCALING FACTOR	(CASALS)	12
"ALLOCATE-CAS" FLAG	CASFLG	1
ALLOCATED INTERDICTION RATE	(ALLINT)	12
INT ALLOCATION SCALING FACTOR	(INTALS)	12
"ALLOCATE-INT" FLAG	INTFLG	1
WEAPONS ALLOCATION		
ALLOCATED NUCLEAR WEAPONS	(ALLNUC)	18
NUC ALLOCATION SCALING FACTOR	(NUCALS)	18
"ALLOCATE-NUC" FLAG	NUCFLG	1
ALLOCATED CHEMICAL WEAPONS	(ALLCHM)	18
CHEM ALLOCATION SCALING FACTOR	(CHMALS)	18
"ALLOCATE-CHEM" FLAG	CHMFLG	1
SERVICE SUPPORT ALLOCATION		
ALLOCATED SUPPLY RATE	(ALLSUP)	18
SUP ALLOCATION SCALING FACTOR	(SUPALS)	18
"ALLOCATE-SUP" FLAG	SUPFLG	1
ALLOCATED REPLACEMENT RATE	(ALLRPL)	18
REPL ALLOCATION SCALING FACTOR	(RPLALS)	18
"ALLOCATE-REPL" FLAG	RPLFLG	1

Figure IV-4. Resource Allocation Block Structure (as Input to Operation Directive)

a) Mission

An integer code designating the particular type of mission to be accomplished in responding to the operation order.

- Range: 0 - 63
- Input Format: Integer

b) Objective

The specific 9.45 km hexagon designated as the objective for the directed operation.

- Range: N/A
- Input Format: Hex Address

2) Disposition Control Information

These information elements constrain the disposition of the force conducting the directed operation.

a) Axis of Operations

An angle specification of axis which controls the orientation of the force conducting the operation vis-a-vis the enemy forces it faces.

- Range: 0 - 360 degress
- Input Format: Integer

b) Sector Width

A width expressed in hexes to be covered (or, approximately, kilometers to be covered x 10) which controls the lateral dispersion of the force conducting the operation.

- Range: 0 - 63 hexes (approximately 0 - 630 kilometers)
- Input Format: Integer

3) Operation Control

This information element--completion time--controls the execution of the operation by specifying a particular time at which the operation should be complete (i.e., at which the force element conducting the operation should be at the specified objective). Expressed in terms of hours after the initial "start" time of the run.

- Range: 0 - 4000 hours
- Input Format: Integer

b. Creating Rescource Allocation Blocks

The creation of a specific resource allocation block as a directive compponent is initiated by the line:

'RESOURCE ALLOCATION'

Referring to Figure IV-4, it will be noted that there are two basic types of information in the allocation block: (1) the allocated resources (of the various types) with which the force conducting the directed operation must operate, and, (2) "allocate-resource" flags (for the various resource types) which control the response of the directed force element to the new allocation guidance.

1) Allocated Resources

These information elements characterize how much of each type of resource is allocated to the directed force element for use in conducting the directed operation.

- Ranges:
  - CAS & Interdiction: 0 - 4000 sorties/day
  - Nuclear Weapons: 0 - 262,000 nuclear weapons units
  - Chemical Weapons: 0 - 262,000 chemical weapons units
  - Supplies: 0 - 262,000 tons/day
  - Replacements: 0 - 262,000 strength units/day
- Input Format: Integer

2) "Allocate-Resource" Flags

These information elements indicate whether or not the directed force element should adjust its resource allocations to conform to the new allocated resource specifications. It should be set to 1 for any resource type for which allocation guidance is specified

- Range: 0,1 (1 = adjust resource allocations for the corresponding resource type)
- Input Format: Integer

2. Creating Readiness Directive Contents

Compared to operation directives, readiness directives have a very simple structure. Referring to Figure IV-2, it will be noted that only two information elements need be input to create a readiness directive.

a. Directed Readiness Type

Indicates whether the readiness directive concerns nuclear or chemical readiness.

- Range: N/A
- Input Format: NUCLEAR/CHEMICAL

b. Directed Readiness State

Specifies the lowest readiness state (of the directed type) at which the directed force element should operate.

- Range: 0 - 7 (7 = highest readiness state)
- Input Format: Integer

3. Creating Weapons Employment Directive Contexts

A weapons employment directive header contains an indication of the type of weapons whose employment is directive; it also contains a reference to a specific package of weapons whose employment is authorized. The directed weapons type is first entered; then the authorized package block is created.

a. Directed Weapons Type

An indicator of the type of weapons--interdiction, nuclear, or chemical--whose employment is directed.

- Range: N/A
- Input Format: INT/NUC/CHM

b. Creating Employment Packages

An employment package block has the structure portrayed in Figure IV-5. Created in the context of a weapons employment directive, it is implicitly linked into the directive header. Its information elements will now be discussed.

1) Employer Information

The unit identity of the EAD C^2I element which is authorized to employ the weapons specified in the package. Note that the

EMPLOYMENT PACKAGE BLOCK (PKGBLK)			
INFORMATION BLOCK ADMINISTRATION			
EMPLOYER INFORMATION			
	EMPLOYER	UNITID	18
WEAPONS INFORMATION			
	WEAPONS TYPE WEAPONS QUANTITY	WPNTYP WPNQUN	3 18
EMPLOYMENT INFORMATION			
	JUSTIFICATION UTILIZATION INTERVAL EXPIRATION TIME	JUSTIF {UTILTM} {EXPRTM}	12 18 18
STRUCTURE INFORMATION			
	NEXT EMPLOYMENT PACKAGE POINTER	PNXPKG*	18

Figure IV-5. Employment Package Block Structure

employer may be different from--and at a lower echelon of command than--the directed force element specified in the directive header.

- Range: N/A
- Input Format: 6-digit Unit Identity

2) Weapons Information

These two information elements specify the type and quantity of weapons authorized for employment. Weapons type is input in the same format as described above. Weapons quantity represents the maximum amount of weapons authorized for employment. Its range and format are as follows:

- Range: 0 - 262,000 appropriate units (sorties, kilotons, or tons)
- Input Format: Integer

3) Employment Information

These two information elements specify the conditions under which the specified weapons are authorized for employment.

a) Justification

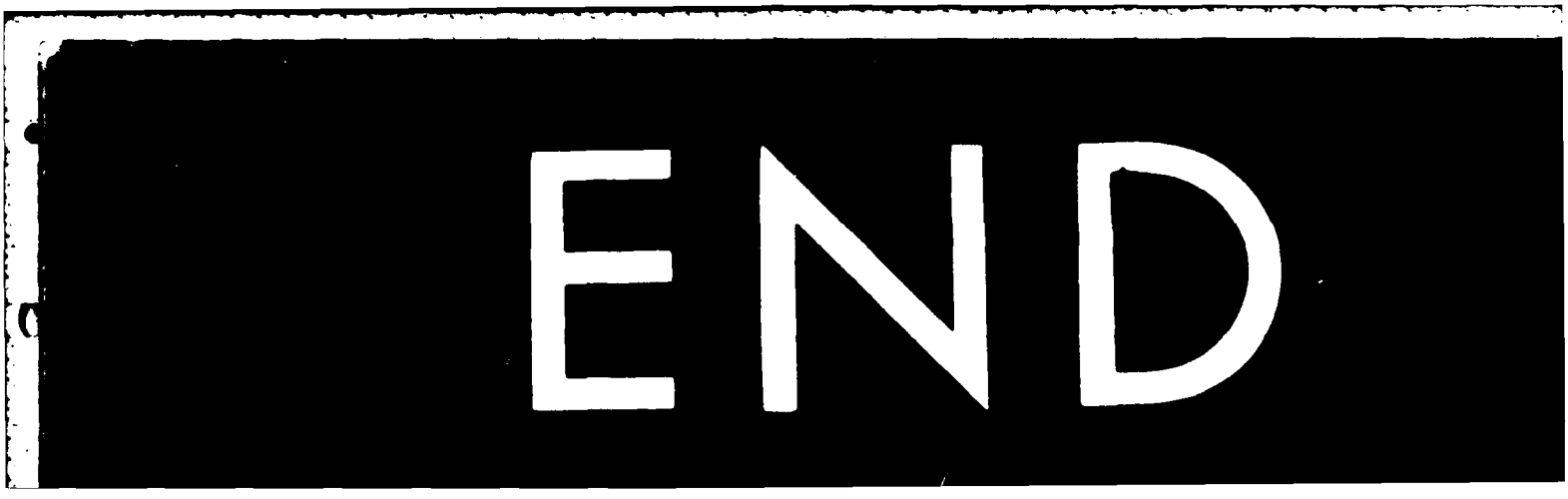
The justification of an employment package delimits the situations under which the specified weapons may be employed. Possible situations are: (1) Critical Forward Operation Progress, (2) Critical Forward Operation Failure, (3) Critical Kernel Operation Progress, (4) Critical Kernel Operation Failure, (5) Critical Strength, (6) Critical Unit Balance, (7) Critical Nuclear Threat, and (8) Critical Chemical Threat. Any or all of these may be flagged an acceptable condition for employment

- Range: N/A
- Input Format: {<FWD PROGRESS/FORWARD FAIL/
  KERNEL PROGRESS/KERNEL FAIL/
  STRENGTH/UNIT BALANCE/
  NUCLEAR THREAT/CHEMICAL THREAT>,}

b) Utilization Interval

The time interval within which the weapons specified in the package are authorized for employment. It is measured from the time at which the specified employer receives the employment directive.

- Range: 0 - 4000 hours
- Input Format: Integer


END